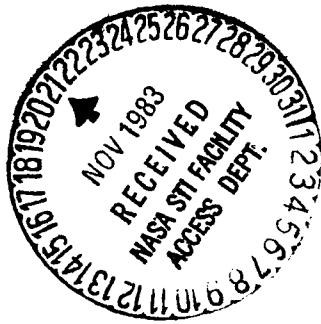




National Aeronautics and  
Space Administration

**Lyndon B. Johnson Space Center**  
Houston, Texas 77058



DMS -DR-2463  
NASA-CR 167,672

SPACE SHUTTLE LRSI TPS TILE TESTS OS41,  
OS42 AND OS45 IN THE NASA/AMES  
RESEARCH CENTER 11x11-FOOT WIND TUNNEL  
USING MODEL 107-0  
(OS41, OS42 AND OS45)

(NASA-CR-167672) SPACE SHUTTLE LRSI TPS  
TILE TESTS OS41, OS42 AND OS45 IN THE  
NASA/AMES RESEARCH CENTER 11 X 11-FOOT WIND  
TUNNEL USING MODEL 107-0 (OS41, OS42 AND  
OS45) (Rockwell International Corp.) 76 p 00/16 42432

N84-70186

Unclass

## SPACE SHUTTLE AEROTHERMODYNAMIC DATA REPORT

**Data Man**AGEMENT SERVICES

HUNTSVILLE ELECTRONICS DIVISION  CHRYSLER  
CORPORATION

October 1983

DMS -DR-2463  
NASA-CR 167,672

SPACE SHUTTLE LRSI TPS TILE TESTS OS41,  
OS42 AND OS45 IN THE NASA/AMES  
RESEARCH CENTER 11x11-FOOT WIND TUNNEL  
USING MODEL 107-Ø  
(OS41, OS42 AND OS45)

by

B. A. Marshall  
Rockwell International  
Space Transportation & Systems Group

Prepared under NASA Contract Number NAS9-16283

by

Data Management Services  
Chrysler Huntsville Electronics Division  
Michoud Engineering Office  
New Orleans, Louisiana 70189

for

Systems Engineering Division

Johnson Space Center  
National Aeronautics and Space Administration  
Houston, Texas

WIND TUNNEL TEST SPECIFICS:

Test Number:	369-1-11	380-1-11	381-1-11
NASA Series Number:	OS41	OS42	OS45
Model Number:	96-Ø/107-Ø	96-Ø/107-Ø	96-Ø/107-Ø
Test Start Date:	4-18-79	7-3-79	8-28-79
Test Completion Date:	4-19-79	7-5-79	9-6-79
Occupancy Hours:	60	53	100

FACILITY COORDINATOR:

J.J. Brownson  
Ames Research Center  
Mail Stop 227-5  
Moffett Field, CA 94035

Phone: (415) 965-5647

PROJECT ENGINEERS:

Rockwell International  
Wind Tunnel Operations  
R.E. Kingsland  
TPS Test

(OS41) Doug Buckler  
Phone: (213) 922-3816

(OS42/45) Ira Victer  
Phone: (213) 922-2557

Rockwell International  
Space Transportation and Systems Group  
12214 Lakewood Blvd.  
Downey, CA 90241

NASA/Ames  
Ames Research Center  
Moffett Field, CA 94035

(OS41) Tony Gross  
Phone: (415) 965-6258

(OS42/45) John Pender  
Phone: (415) 965-6701

DATA MANAGEMENT SERVICES:

Prepared by: Liaison -- S. R. Houlihan  
Operations - B. J. Burst

Reviewed by: C. W. Klug

Approved: J. L. Glynn  
J. L. Glynn, Manager  
Data Operations

Concurrence: N. D. Kemp  
N. D. Kemp, Manager  
Data Management Services

Chrysler Huntsville Electronics Division/Michoud Engineering Office assumes  
no responsibility for the data presented other than display characteristics.

SPACE SHUTTLE LRSI TPS TILE TESTS OS41  
OS42 AND OS45 IN THE NASA/AMES  
RESEARCH CENTER 11x11-FOOT WIND TUNNEL  
USING MODEL 107-Ø  
(OS41, OS42 AND OS45)

by

B.A. Marshall  
Rockwell International  
Space Transportation & Systems Group

ABSTRACT

An experimental investigation (OS41, OS42 and OS45) was conducted in the NASA/Ames Research Center (ARC) 11x11-foot Wind Tunnel during the year 1979. Test OS41 was conducted from April 18 through April 19; test OS42 was conducted from July 3 through July 5; and test OS45 was conducted from August 28 through September 6. The purpose of these tests was to obtain performance characteristics of cracked and damaged Low Temperature Reusable Surface Insulation (LRSI) tiles and mini-tiles when subjected to a transonic shock and turbulent flow environment.

The same test article was used during tests OS41, OS42 and OS45. The general test configuration during all three tests was representative of LRSI and mini-tile arrays on the Shuttle upper fuselage forward of the windshield and on top of the canopy and payload bay door side rails.

As a result of testing, some cracking and chipping of the LRSI tiles occurred during test OS41. During test OS42, there was a loss of 3 mini-tiles prior to achieving test conditions with minimal propagation of surface damage. There was no tile loss during OS45.

## TABLE OF CONTENTS

	<u>Page</u>
<b>ABSTRACT</b>	iii
<b>INDEX OF MODEL FIGURES</b>	2
<b>INTRODUCTION</b>	4
<b>NOMENCLATURE</b>	6
<b>REMARKS</b>	9
<b>CONFIGURATIONS INVESTIGATED</b>	10
<b>INSTRUMENTATION</b>	13
<b>TEST FACILITY DESCRIPTION</b>	15
<b>TEST PROCEDURE</b>	16
<b>DATA REDUCTION</b>	17
<b>REFERENCES</b>	18
<b>TABLES</b>	
I. TEST CONDITIONS	19
II. DATASET/RUN NUMBER COLLATION SUMMARY	24
III. X-Y POSITIONS FOR PRESSURE ORIFICES	40
<b>MODEL FIGURES</b>	42
<b>APPENDIX</b>	72
TABULATED SOURCE DATA (Microfiche Only) - See Appendix page for index.	

## INDEX OF MODEL FIGURES

<u>FIGURE</u>		<u>PAGE</u>
1	MODEL FIGURES	
a.	Model 96-0 Test Fixture General Arrangement (OS41, OS42 and OS45)	42
b.	Test OS41 Cracked Tile Configuration (Pretest)	43
c.	Test OS42 and OS45 Mini-Tile Configuration	44
d.	Test OS42 LRSI Tile Panel	45
e.	5 Production LRSI Tile Locations for Test OS45	46
f.	Test Fixture Instrumentation for Tests OS41, OS42 and OS45	47
g.	LRSI Tile Panel Subsurface Accelerometer Instrumentation	48
h.	LRSI Panel Accelerometer Locations	49
i.	LRSI Tile Panel Subsurface Strain Gage Instrumentation	50
j.	6 Different Pressure Tap Mountings used during Test OS45	51
k.	All Pressure Orifices on the LRSI Panel for Test OS45	52
l-p.	Pressure Orifice Locations on the LRSI Panel for Test OS45	53-57
2	MODEL PHOTOGRAPHS	
a.	Model 107-0 Installed in the 96-0 Test Fixture in the ARC 11x11-Foot Wind Tunnel	58
b.	Post-Test Photograph of the LRSI Test Specimen for Test OS41	59
c.	Post-Test Photograph of the LRSI Test Specimen for Test OS42	60

INDEX OF MODEL FIGURES (Concluded)

<u>FIGURE</u>		<u>PAGE</u>
2	MODEL PHOTOGRAPHS (Continued)	
d,e.	Post-Test Photograph of the Mini-Tile Damage on the LRSI Test Specimen for Test OS42	61
f.	Post-Test Photograph of the Mini-Tile SIP Extension on the LRSI Test Specimen for Test OS42	63
g.	Post-Test Photograph of the Mini-Tile Gaps on the LRSI Test Specimen for Test OS42	64
h,i.	Post-Test Photograph of the Mini-Tile SIP Extension on the LRSI Specimen for Test OS42	65
j.	Pretest Photograph of the Mini-Tile LRSI Test Specimen for Test OS45	67
k,l,m,n.	Post-Test Photograph of the Mini-Tile LRSI Test Specimen for Test OS45	68-71

## INTRODUCTION

Tests OS41, OS42 and OS45 were part of an investigation of the Low Temperature Surface Insulation (LRSI) Thermal Protection System (TPS) on the Space Shuttle Orbiter. The purpose of these tests was to obtain performance characteristics of cracked and damaged LRSI tiles and mini-tiles when subjected to a transonic shock and turbulent flow environment similar to that experienced during Shuttle flight.

The aerodynamic shock was generated using the 96-Ø test fixture in the 11-foot wind tunnel. The leading edge flap, located on the 96-Ø test fixture, functioned to cause an expansion/recompression shock over the LRSI test article which simulated the upper canopy flow field.

The same test article (model 107-Ø) was mounted in the 96-Ø test fixture during tests OS41, OS42 and OS45. It should be noted, however, that alterations were made to the original OS41 test article configuration prior to OS42 and again prior to test OS45. The general test configuration during all three tests was representative of LRSI and mini-tile arrays found on the Shuttle upper fuselage forward of the windshield and on top of the canopy and payload bay door side rails.

Test OS41 was conducted at Mach numbers varying from 0.76 to 0.88 and dynamic pressures varying from 544 PSF to 646 PSF. The fixture leading edge flap was set at 20 degrees.

Test OS42 was conducted primarily at a Mach number of 0.86 and dynamic pressure of 630 PSF for a time duration of 110 minutes on condition. The time duration

## INTRODUCTION (Concluded)

of 110 minutes on condition simulated the shock and turbulent flow environments for 220 Space Shuttle flights (30 seconds/mission).

Test OS45 was conducted primarily at a Mach number of 0.87 and dynamic pressure of 638 PSF for a total of 55 minutes. The leading edge flap was set at 24 degrees during tests OS42 and OS45.

All test objectives were met during OS41, OS42 and OS45. This report presents information on the conduct of the tests, test fixture, test facility, instrumentation particulars, and data collected during the tests. In addition, photographs of the test fixture and test article are included. Basic geometric data were plotted by Data Management Services but are not presented herein.

NOMENCLATURE

<u>SYMBOL</u>	<u>MNEMONIC</u>	<u>DEFINITION</u>
ARC		Ames Research Center
ATM	ATM	Atmospheric Pressure
	CONF	Configuration Code
CONST		Constant
C <sub>P</sub>	CP	Local Pressure Coefficient
C <sub>P</sub> <sub>RMS</sub>	CPRMS	RMS Local Pressure Coefficient
	DATE	Calendar Date on which Data were Recorded, in Months and Days
DB, dB		Volume of Sound, decibel
DEG		Degree
	DPBOX	Differential Pressure across the Pressure Box, psid
FLAP, Ø	DFLAP, PHI	Test Fixture Flap Setting, degrees
ft.		Feet or Foot
	GAIN	Heff Amplifier Gain, volts/volt
g <sub>RMS</sub>		Root Mean Square Acceleration, ft/second <sup>2</sup>
H <sub>g</sub>		Mercury
ID		Inside Diameter
K <sub>g</sub>		Calibration Constant, counts/ft/second <sup>2</sup>
KRMS		Calibration Constant, volts/count
KTRAN		Sensor Sensitivity, volts/Engineering Unit
L.E.		Leading Edge
LI 900		9 Pounds/ft <sup>3</sup> LRSI tiles
LRSI		Low Temperature Reusable Surface Insulation
Mach	M,MACH	Freestream Mach Number

NOMENCLATURE (Continued)

<u>SYMBOL</u>	<u>MNEMONIC</u>	<u>DEFINITION</u>
NA		Not Applicable
NASA		National Aeronautics and Space Administration
NO, NO.		Pressure Tap Number
OD		Outside Diameter
P	(in parameter block)	Freestream Static Pressure, psf
P'		Local Fluctuating Pressure, psi
	PBOX	Pressure Inside the Pressure Box, psi
PL, PL	(in dependent variable)	Local Static Pressure, psi
	PR	Ratio of Local Static Pressure to Free-stream Static Pressure
P <sub>RMS</sub>		RMS Pressure , psia
PSF, psf		Pounds Per Square Foot
PSI		Pounds Per Square Inch
PSIA, psia		Absolute Pressure, pounds per square inch
psid		Differential Pressure, pounds per square inch
PT	PT	Freestream Total Pressure, psf or in. Hg
q	Q	Freestream Dynamic Pressure, psf
REQD		Required
R <sub>g</sub> <sub>RMS</sub>		RMS Accelerometer Reading, ft/second <sup>2</sup>
RHO		Freestream Density, slugs/ft <sup>3</sup>
RMS		Root Mean Square
Re	RN	Freestream Reynolds' Number, per foot $\times 10^{-6}$

NOMENCLATURE (Concluded)

<u>SYMBOL</u>	<u>MNEMONIC</u>	<u>DEFINITION</u>
RTV		Room-Temperature Vulcanized Adhesive
RUN	RUN	Wind Tunnel Run Number
S		Strain Gage
SEQ		Tunnel Run Sequence Number
SIP		Strain Insulator Pad
sq.		Square
$s_{RMS}$		RMS Strain, inches
SYB		Symbol
TIME		Time of Day at which Data were Recorded, HHMM (24 hour clock)
TPS		Thermal Protection System
TR		Freestream Static Temperature, $^{\circ}\text{R}$
TTF		Freestream Total Temperature, $^{\circ}\text{F}$
X	X	Longitudinal Distance on Panel or Fixture - positive, inches aft of panel leading edge
Y	Y	Lateral Distance on Panel or Fixture-positive, inches right of panel centerline
Z	Z	Vertical Distance on Panel-positive, inches above the skin of the holding panel

REMARKS

Upon removal of the OS41 (Cracked Tile) panel from the 96-Ø test fixture, it was discovered that 11 of the 12 accelerometers had come unglued and fallen loose from the panel. Only #6 was still attached and reading properly. None of the dynamic data are presented.

## CONFIGURATIONS INVESTIGATED

### TEST FIXTURE DESCRIPTION

The 96-Ø test fixture, originally used for test OS31A, was modified for tests OS41, OS42 and OS45. The basic components consist of the pressure box, leading edge flap, side plates, and the tile panel. The fixture, depicted in Figure 1a, functions to cause an expansion shock pattern ahead of the specimen, followed by a recompression shock region with attendant positive pressure gradients and high turbulence levels over the test specimen.

The pressure box enclosed the area under the tile panel. Prior to performing these three tests, the depth of the pressure box was increased by 5 inches from the original configuration to accommodate thicker panels. Also, the box was sealed to withstand pressures up to +8 psid and was filled with sound absorptive acoustic material to minimize internal pressure fluctuations.

Two 1/4-inch OD and two 1" ID steel lines were connected to the box for controlling the pressure inside the box, and for pressurizing and evacuating. In addition, there were two pneumatically controlled valves - one on each side of the box. The valves were used to equalize the pressure inside the box with the tunnel static pressure in the event of an emergency tunnel shutdown. The box was accessed through a door located aft of the tile panel.

Rework of the leading edge flap actuating mechanism was required due to

#### CONFIGURATIONS INVESTIGATED (Continued)

modifications to the pressure box. However, the leading edge flap still functioned to produce the desired shocks and could be remotely actuated from 0° to 30°. The flap length measured fifteen inches with a leading edge radius of 1/2-inch. The radius from the flap surface to the center of rotation was fixed at 2-3/4 inches.

The potentiometer used to indicate the position of the flap was located next to the hydraulic cylinder. The side plates were beveled 10° at the forward and trailing outboard edges. The leading edge had a 1/16-inch blunt edge. The side plates extended to the tunnel floor and were supported from underneath. No modifications were required on the side plates.

#### TEST SPECIMEN

The LRSI tile panel used for OS31A was used for tests OS41, OS42 and OS45. The panel (model 107-Ø) was changed slightly from the OS31A configuration to accommodate the modified 96-Ø test fixture. The LRSI tile panel is nominally 24x40 inches to accommodate thirteen 8x8-inch tiles and four half tiles. The LRSI tiles are 0.85 inches thick and are mounted on top of 0.16-inch thick SIP. It should also be noted that a nominal 0.055-inch gap exists between the tiles.

The LRSI tile panel is composed of a thin aluminum alloy substrate with hat-section stringers lining the bottom of the substrate. Due to modifications made on the pressure box, clips were attached to the stringer ends

#### CONFIGURATIONS INVESTIGATED (Concluded)

and to the panel frame. These clips were used to clamp the tile panel flush with the upper surface of the test fixture.

Test OS41 involved thin tiles with the surface coat intentionally cracked prior to testing as shown in Figure 1b. Seven of the seventeen tiles on the OS42 test panel were in a mini-tile configuration as shown in Figure 1c. In addition, some of the seventeen LRSI tiles used for OS42 were intentionally chipped or cracked. The locations of these tiles are shown in Figure 1d.

Three of the seventeen tiles on the OS45 test panel were constructed of flight material (LI 900) in a mini-tile configuration as shown in Figure 1e. Figure 1e depicts those mini-tiles to which a special "edge-fix" had been applied. The "fix" was fabricated by using a specially designed hypodermic needle which was inserted in the tile gap. The needle depressed the filler bar and was turned 90° and moved along the edge of the tile while forcing RTV between the tile lower surface and the upper surface of the filler bar.

## INSTRUMENTATION

During the conduct of tests OS41, OS42 and OS45, the 96-Ø test fixture was instrumented with fourteen pressure orifices around the periphery of the test structure as shown in Figure 1f. The pressure data show the test environments to which the LRSI tile panel was exposed. In addition, all three tests employed a potentiometer to determine the location of the leading edge flap.

During the conduct of tests OS41 and OS45, twelve accelerometers were located on the bottom surface of the LRSI tile panel substrate or stringers. Figure 1g shows the locations of the accelerometers used for test OS41 and Figure 1h shows the locations of the accelerometers used for test OS45. Only seven of the twelve accelerometers were mounted in the same locations for both tests. Endevco model 2222 micro-miniature accelerometers were employed for these tests.

During OS41, strain gages were located on the bottom surface of the LRSI tile panel as shown in Figure 1i. Two locations used strain gages at orthogonal directions which brought the total number to twelve.

During test OS45, the LRSI tiles were instrumented with one hundred and thirty eight pressure taps in the tiled area in addition to the 14 pressure orifices on the test fixture. Figure 1j illustrates the six different areas in which the pressure taps were located. The following list describes the locations of the six different pressure tap mountings shown in Figure 1j:

## INSTRUMENTATION (Concluded)

- A. The gap between the mini-diced tiles just above the RTV which bonds the tiles to the SIP.
- B. The interior of the SIP beneath a mini-diced tile.
- C. The space between the SIP and the filler bar just above the RTV which bonds the SIP to the skin.
- D. The gap between tiles just above the RTV which bonds the tiles to the SIP.
- E. The interior just above the RTV which bonds the tile to the SIP of a mini-diced tile.
- F. Flush with the top (exposed) surface of the mini-diced tile.

Figures 1k through 1p show the designated locations of the one hundred and thirty eight pressure taps in the tiled area. These pressures were used to evaluate the porosity of the tiles, pressure migration in the SIP, pressures in the gaps between the tiles and the mini-tiles, and pressures on the tile surface. Table III gives the pressure orifice X-Y positions.

## TEST FACILITY DESCRIPTION

The Ames Research Center Unitary Plan 11 by 11-Foot Transonic Wind Tunnel is a closed-circuit, air-medium, variable-density facility capable of attaining Mach numbers from 0.4 to 1.4 at Reynolds numbers from  $1.7 \times 10^6/\text{ft}$  to  $9.4 \times 10^6/\text{ft}$ . The test section is 22 feet long, and models are installed on internal strain-gage balanced mounted to sting-type support systems.

Shadowgraph and Schlieren photographic equipment is available, and pressure transducer instrumentation is provided.

Tunnel operating temperature is 580°R. Extended high Reynolds number runs are restricted by power availability.

#### TEST PROCEDURE

The basic test procedure used during tests OS41, OS42 and OS45 was to first set the leading edge flap at zero degrees, Mach number at zero and total pressure at 15 inches of mercury. The Mach number, flap angle and the total pressure were adjusted and data were collected in accordance with the test run summaries depicted in Table II.

The LRSI tile panel was tested for 52 minutes during OS41, 110 minutes during OS42 and 55 minutes during OS45. For every 30 seconds on condition, the LRSI test panel was subjected to a simulated shock and turbulent flow environment equivalent to one Space Shuttle flight. The test conditions for tests OS41, OS42 and OS45 are shown in Table I.

## DATA REDUCTION

Standard tunnel equations were used during OS41, OS42 and OS45 to compute all tunnel conditions. Local static pressure data were reduced to standard coefficient form using the following equation:

$$C_p = \frac{(P_L - P) \times 144}{q}$$

Local fluctuating pressure characteristics were calculated during OS41 using the following equations:

$$C_{P_{RMS}} = \frac{P_{RMS}}{q}$$
$$dB = 20 \log \frac{P'}{0.29 \times 10^{-8}}$$

Accelerometer and strain gage data were calculated during OS41 using the following equation:

$$g_{RMS} \text{ or } S_{RMS} = \frac{R_g_{RMS}}{Kg}$$

Static pressure data collected during tests OS41, OS42 and OS45 are presented in the appendix (microfiche).

REFERENCES

1. STS-79-0030, "Pretest Information for Tests OS-36 and OS-41 (Model 96-Ø) and OS-37 (Model 81-Ø) in the Ames Research Center Unitary Plan Wind Tunnels," by R. B. Kingsland, dated February 1979.
2. STS-79-0257, "Pretest Information for Tests OS-42/OS-43 (Model 107-Ø) in the Ames Research Center Unitary Plan 11 Foot Wind Tunnel," by R. B. Kingsland, dated June 1979.
3. STS-79-0280, "Pretest Information for Test OS-45 (Model 107-Ø) in the Ames Research Center Unitary Plan 11 Foot Wind Tunnel," by W. R. Carlson, dated August 1979.



TABLE I (Continued)

TEST : OS 42

DATE: 7-5-79

## TEST CONDITIONS

BALANCE UTILIZED: NA

**CAPACITY:**

### ACCURACY:

**COEFFICIENT  
TOLERANCE:**

NF	_____	_____	_____
SF	_____	_____	_____
AF	_____	_____	_____
PM	_____	_____	_____
RM	_____	_____	_____
YM	_____	_____	_____

**COMMENTS:**

TABLE I (Continued)

TEST : OS 45		DATE : 9-6-79	
TEST CONDITIONS			
MACH NUMBER	TOTAL PRESSURE (Inches of Hg)	DYNAMIC PRESSURE (pounds/sq. ft.)	
0	15 - 30	0	
.19	15	26	
.20	15	29	
.22	15 - 30	35 - 69	
.24	15	41	
.25		44	
.28		55	
.29		59	
.35		83	
.38		97	
.40		106	
.42		116	
.45		130	
.48		146	
.49		151	
.50	Y	156	

BALANCE UTILIZED:	<u>NA</u>		
CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:	
NF	_____	_____	_____
SF	_____	_____	_____
AF	_____	_____	_____
PM	_____	_____	_____
RM	_____	_____	_____
YM	_____	_____	_____

COMMENTS:

TABLE I (Continued)

TEST : OS45

DATE : 9-6-79

## TEST CONDITIONS

MACH NUMBER	TOTAL PRESSURE (Inches of Hg)	DYNAMIC PRESSURE (pounds/sq. ft.)
.53	15	172
.55		182
.57		193
.58		198
.60		209
.61		214
.62		219
.65		235
.67		246
.68		251
.71		266
.74		282
.76		291
.77		296
.78		301
.79	Y	306

BALANCE UTILIZED: NA

CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF	_____	_____
SF	_____	_____
AF	_____	_____
PM	_____	_____
RM	_____	_____
YM	_____	_____

COMMENTS:

TABLE I (Concluded)

TEST : OS 45

DATE : 9-6-79

## TEST CONDITIONS

BALANCE UTILIZED: NA

CAPACITY.

#### ACCURACY:

## **COEFFICIENT TOLERANCE:**

NF

— 1 —

Digitized by srujanika@gmail.com

SF

AF

PM

PM

#### COMMENTS.

TABLE II

RUN SUMMARY(OS41)

TEST OS41 (ARC 369-1-11)

DATE : 4-19-79

## TYPE OF DATA OFFICIALLY SCHEDULED

MUVAH III İÜVAR İZİ NOV

0541 DATASET CODE

## A - PRESSURE COEFFICIENT DATASET CODE

C - STRAIN GAGE



TABLE II (Continued)

## RUN SUMMARY (OS 42) (continued)

TEST: OS 42 (ARC 380-1-11)

DATE : 7-5-79

DATA SET IDENTIFIED	CONFIGURATION	SCHED. CONTROL DEFLECTION			NO. OF RUNS		MACH NUMBERS ( OR ALTERNATE INDEPENDENT VARIABLE )	
		$\alpha$	$\beta$	M	P <sub>T</sub>	$\phi$	Run	Seq
* 30019	042 DICEPTILE			.89	19.0	24°		
20		.89		20.0	24°		7	
21		.89		20.9	24°		8	
22		.89		21.9	24°		9	
23		.89		22.8	24°		10	
24		.89		23.8	24°		11	
25		.89		24.7	24°		12	
26		.88		25.6	24°		13	
27		.88		26.5	24°		14	
28		.88		27.4	25°		15	
29		.88		28.2	25°		16	
30		.87		28.4	24°		17	
31		.87		28.1	24°		6	1
32		.87		28.1	24°		2	
33		.87		28.1	25°		3	
34		.87		28.1	25°		4	
35		.87		28.1	25°		5	
36	Y	.87		28.1	25°		6	
1								
7								
13								
19								
25								
31								
37								
43								
49								
55								
61								
67								
75								
76								

IDVAR (1) IDVAR (2) NDV

COEFFICIENTS

 $\alpha$  OR  $\beta$   
SCHEDULES

TABLE II (Continued)

## RUN SUMMARY (OS 42) (continued)

TEST: OS 42 (ARC 380-1-11)

DATE: 7-5-79

DATA SET IDENTIFIER	CONFIGURATION	SCHD.			NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)	
		$\alpha$	$\beta$	M			
*30037	442 DICED TILE	.87	.28.1	25°	6	7	
38		.88	.14.7	24°	7	1	
39		.88	.14.8	25°	2		
40		.89	.15.4	25°	3		
41		.89	.18.2	25°	6		
42		.89	.19.1	25°	7		
43		.88	.20.8	25°	9		
44		.88	.21.7	24°	10		
45		.88	.22.5	25°	11		
46		.88	.24.2	25°	13		
47		.88	.25.0	25°	14		
48		.88	.26.6	24°	15		
49		.88	.26.7	25°	16		
50		.88	.27.5	25°	17		
51		.88	.28.2	25°	18		
52		.86	.28.0	25°	8	1	
53		.87	.28.1	25°	2		
54	Y	.87	.28.1	25°	3		
							75.76
							67
							61
							55
							37
							43
							49
							31
							19
							13
							7
							1

$\alpha$  OR  $\beta$   
SCHEDULES

COEFFICIENTS

IDVAR (1) IDVAR (2) NDV

TABLE II (Continued)

## RUN SUMMARY (OS42) (continued)

TEST : C-2 (ARC 380-1-11)

DATE : 7-5-79

DATA SET IDENTIFIERS	CONFIGURATION	SCHED. CONTROL DEFLECTION			NO. OF RUNS	MACH NUMBERS ( OR ALTERNATE INDEPENDENT VARIABLE )
		$\alpha$	$\beta$	M		
*300155	042 DICED TIE	.87	28.1	25°	5	
56		.87	28.1	25°	8	4
57		.87	28.0	25°	6	
58		.87	28.1	25°	9	1
59		.88	27.6	25°	2	
60		.88	27.2	25°	3	
61		.88	26.7	25°	4	
62		.88	26.0	25°	5	
63		.88	25.6	25°	6	
64		.88	25.1	25°	7	
65		.88	24.7	25°	8	
66		.88	24.3	25°	9	
67		.89	23.8	25°	10	
68		.89	23.4	25°	11	
69		.89	23.0	25°	12	
70		.88	22.7	25°	13	
71		.88	22.3	25°	14	
72		.89	21.9	24°	15	
						67
1		13	19	25	31	55
					37	55
					49	61
						75 76
					IDVAR (1)	IDVAR (2)
					IDVAR (1)	NDV
					COEFFICIENTS	
		$\alpha$ OR $\beta$				
		SCHEDULES				

TABLE II (Continued)

## RUN SUMMARY (OS42) (concluded)

TEST: OS42 ARC(380-1-11)

DATE: 7-5-79

## RUN SUMMARY (OS45)

TEST : OS45 (ARC 381-1-11)

DATA SET RUN NUMBER COLLATION SUMMARY

DATE :

URIA SEI RUI NUMBER COLLATION SUMMARY

DATA SET IDENTIFIER	CONFIGURATION	IN HG			TEST RUN NUMBER
		M	P <small>T</small>	F <small>LAP</small>	
E3S-AA	O	ATM	0	103	1
AB	ATM			1	2
AC	15			25	1
AD	15			106	1
AE	.25			1	2
AF	0			3	
AG	.19			4	
AH	0			5	
AI	0			6	
AJ	.28			7	
AK	.45			8	
AL	.55			9	
AM	.65			10	
AN	.760			11	
AO	.760			12	
AP	.764			13	
AQ	.784			14	
AR	.791			15	

	$\alpha$ OR $\beta$	SCHEDULES	COEFFICIENTS	COVAR (1)	COVAR (2)	NOV	DEC
1	7	13	19	25	31	37	43
2						49	55
3						61	67
4						73	76

OSSES CONSIDÉRÉES

卷之三

卷之三

- GAP BETWEEN DICE & TILES
- GAP BETWEEN TILES
- SURFACE OF FIXTURE

WINTER'S ESTATE TILES  
SKIFFE OF THE

## C - SURFACE OF FIXTURE

## **S - CAVITY BETWEEN SIP AND SILEX BAR**

H - CHAPTER FIVE

NASA·MSFC·MAF

TABLE II (Continued)

## RUN SUMMARY (0545) (continued)

TEST:0545-ARC 381-1-11

NASA-MSFC-MAF

TABLE II (Continued)

## RUN SUMMARY (CS45) (continued)

TEST: OS45 (ARC 381-1-11)

## DATA SET, RUN NUMBER COLLATION SUMMARY

DATE:

DATA SET IDENTIFIER	CONFIGURATION	TEST RUN NUMBER				MACH NUMBERS
		M	P	T	FLAP	
R3S-BK		40	15	0	113	4
BL		50	1			5
BN		.60	1			6
BN		.62	1			7
BD		.45	1			8
BP		.35	1			9
BQ		.29	1			10
BR		.24	1			11
BS		0	1			12
BT		.20	1			13
BU		.38	1			14
BV		.49	1			15
BW		.58	1			16
BX		.68	1			17
RY		.777	1			18
BZ		.768	1			19
CA		.792	1			20
CB		.824	V	V	V	21
		7	13	19	25	31
					37	43
					49	55
					61	66
					75	76
COEFFICIENTS						
$\alpha$ OR $\beta$						
SCHEMES						
(CVAR (1))						
(CVAR (2)) NOV						

TABLE II (Continued)

## RUN SUMMARY (OS45) (continued)

TEST: OS45 (ARC 381-1-11)

## DATA SET/RUN NUMBER COLLATION SUMMARY

DATE:

DATA SET IDENTIFIER	CONFIGURATION	TEST RUN NUMBER						MACH NUMBERS
		M	P	T	FLAP	RUN	SEQ	
R35-CC		.735	15	0		113	22	
CD		.769	1	1		1	23	
CE		.805				24		
CF		.809				25		
CG		.825				26		
CH		.827				27		
CT		.815				28		
CJ		.884				29		
CK		.873				30		
CL		.87				114	1	
CM						1	2	
CN						24	1	
CD						1	3	
CP						Y	4	
CR						18	15	
CS						18	1	
CS						21	116	
CT						21	1	
↓ CT						Y 24	2	
						V 13	1	
						19	1	
						25	31	
						37	43	
						49	55	
						61	67	
								7E 76
COEFFICIENTS								
$\alpha$ OR $\beta$								
SCHEMES								
IDVAR (1) IDVAR (2) NOV								

TABLE II (Continued)

## RUN SUMMARY (OS45) (continued)

TEST: OS45 (ARC 381-111)

## DATA SET, RUN NUMBER COLLATION SUMMARY

DATA SET IDENTIFIER		CONFIGURATION	M	PT FLAP	RUN SEQ	MACH NUMBERS		TEST RUN NUMBER	
R35-CU			.87	24	117	2			
CV			1	28	118	1			
CW						2			
CX						3			
CY						4			
CZ						5			
DA			Y	Y	6				
DB			27.8	119	1				
DC			27.0	1	2				
DD			26.1	1	3				
DE			25.3	1	4				
DF			24.5	1	5				
DG			23.8	1	6				
DH			23.0	1	7				
DT			22.4	1	8				
DJ			21.7	1	9				
DK			21.0	1	10				
DL			Y 20.4	Y	Y 11				
	?	13	19	25	31	37	43	49	55
									61
									67
									75
									76
COEFFICIENTS									
LEVVAR (1) IDVAR (2) NDV									
α OR β SCHEDULES									

TABLE II (Continued)

## RUN SUMMARY (OS 45) (continued)

TEST : OS45 (ARC 381-1-11)

DATA SET / RUN NUMBER COLLATION SUMMARY

DATE :

DATA SET IDENTIFIER	CONFIGURATION	TEST RUN NUMBER			MACH NUMBERS
		M1	P1	FLAP	
R35-DM		.87	19.8	24	119 12
DN			19.2		13
DO			18.6		14
DP			18.1		15
DQ			17.5		16
DR			17.0		17
DS			16.5		18
DT			16.0		19
DU			15.6		20
DV			15.0		21
DW			15.0		22
DX		↓	15.0		23
DY		0	15.0		
DZ		0	ATM	12D 1	
EA		0	15	↓ 2	
ES		0		153 1	
EC				124 1	
ED		.25	↓	2	
		.42	↓	ψ 3	
7	13	19	25	31 37 43	49 55 61 67 75 76
					1DVAR (1) 1DVAR (2) NOV
					COEFFICIENTS
					α OR β SCHEDULES

TABLE II (Continued)

## RUN SUMMARY (0545) (continued)

TEST : 0545 (ARC 381-1-11)		DATA SET, RUN NUMBER COLLATION SUMMARY				DATE :	
DATA SET IDENTIFIER	CONFIGURATION	M	P <small>T</small>	F <small>LAP</small>	R <small>UNISER</small>	MACH NUMBERS	
B3S-EE		.53	15	24	124	4	
EF		.61			1	5	
EG		.71	Y	Y	Y	6	
EH	O	ATM	O	111	1		
EI		.35	15	24	125	2	
EJ		.48			1	3	
EK		.57			4		
EL		.67				5	
EM		.77				6	
EN		.855				7	
EO		.867				8	
EP		.857				9	
EQ		.856				10	
ER		.859				11	
ES		.860				12	
ET		.866				13	
EU		.862				14	
EV		.854	Y	Y	Y	15	
		7	13	19	25	31	37
						43	49
						55	61
						67	75 76
COEFFICIENTS		DVAR (1)	DVAR (2)	NOV			
$\alpha$ OR $\beta$							
SCHEMES							

TABLE II (Continued)

RUN SUMMARY (OS45) (continued)

TEST : 0545 (ARC 381-1-11)

TABLE II (Continued)

RUN SUMMARY (OS45) (continued)

EST:OS45 (ARC 381-1-11)

DATA SET: RUN NUMBER COLLOCATION SUMMARY

DATE :

NASA-HSF C-MAF

סְכָמָן תְּבִיבָה

WBS 21 (Concluded)

# RUN SUMMARY (OS45) (concluded)

TEST : OS45 (ARC 381-1-1)

DATA SET/RUN NUMBER COLLATION SUMMARY

DATE :

DATA SET IDENTIFIER	CONFIGURATION	TEST RUN NUMBER			MACH NUMBERS
		M	P T FLAP	RUN SEQ	
R3SHGG	QUARTZ PILLOW	.8	15 0	135 1	
GH		1	18 1	136 1	
GI		21		137 1	
GJ		24		138 1	
GK		27		139 1	
GL	ATM			140 1	
GM				2	
GN				3	
GD				4	
GP				5	
GQ				6	
GR				7	
GS				8	
GT				9	
GU				10	
GV				11	
GW				12	
Y GS	Y	0	Y	141 1	
Y					
1	7	13	19	25	31 37 43 49 55 61 ε ~ 75 76
					DVAR(1) DVAR(2) NOV
					COEFFICIENTS
					α OR β SCHEDULES

TABLE III  
X-Y POSITIONS FOR PRESSURE ORIFICES

GAP BETWEEN DICED TILES				GAP BETWEEN TILES			
SYB NO.	X	Y	Z	SYB NO.	X	Y	Z
0 R- 1	11.35	-1.45	-0.85	0 D- 1	9.72	0.00	-0.85
0 R- 2	13.11	-1.45	-0.85	0 D- 2	11.62	0.00	-0.85
0 R- 3	14.86	-1.45	-0.85	0 D- 3	13.42	0.00	-0.85
0 R- 4	16.90	-2.26	-0.85	0 D- 4	16.60	0.00	-0.85
0 R- 5	12.67	-2.26	-0.85	0 D- 5	9.08	-1.45	-0.85
0 R- 6	13.74	-2.26	-0.85	0 D- 6	17.14	-1.45	-0.85
0 R- 7	15.22	-2.26	-0.85	0 D- 7	9.08	-6.65	-0.85
0 R- 8	16.90	-5.79	-0.85	0 D- 8	16.90	-8.06	-0.85
0 R- 9	12.67	-5.79	-0.85	0 D- 9	12.67	-8.06	-0.85
0 R- 10	13.74	-5.79	-0.85	0 D- 10	13.74	-8.06	-0.85
0 R- 11	15.22	-5.79	-0.85	0 D- 11	15.32	-8.06	-0.85
0 R- 12	11.35	-6.65	-0.85	0 D- 12	17.14	-6.65	-0.85
0 R- 13	13.11	-6.65	-0.85	0 D- 13	25.19	1.05	-0.85
0 R- 14	14.86	-6.65	-0.85	0 D- 14	27.17	0.00	-0.85
0 R- 15	22.32	-1.45	-0.85	0 D- 15	28.92	0.00	-0.85
0 R- 16	26.74	-2.26	-0.85	0 D- 16	25.19	-1.45	-0.85
0 R- 17	26.60	-2.26	-0.85	0 D- 17	33.25	-8.95	-0.85
0 R- 18	34.92	-8.05	-0.85	0 D- 18	33.25	-10.75	-0.85
0 R- 19	35.52	-8.95	-0.85				
0 R- 20	34.92	-9.81	-0.85				
0 R- 21	35.52	-10.75	-0.85				

ON SURFACE OF FIXTURE				INSIDE AT BOTTOM OF TILES			
SYB NO.	X	Y	Z	SYB NO.	X	Y	Z
* P- 1	2.05	16.00	0.00	* E- 1	16.90	-1.45	-0.80
* P- 2	4.05	16.00	0.00	* E- 2	12.67	-1.45	-0.80
* P- 3	6.05	16.00	0.00	* E- 3	13.74	-1.45	-0.80
* P- 4	8.05	16.00	0.00	* E- 4	15.32	-1.45	-0.80
* P- 5	10.05	16.00	0.00	* E- 5	16.90	-6.65	-0.80
* P- 6	12.05	16.00	0.00	* E- 6	12.67	-6.65	-0.80
* P- 7	14.05	16.00	0.00	* E- 7	13.74	-6.65	-0.80
* P- 8	16.05	16.00	0.00	* E- 8	15.32	-6.65	-0.80
* P- 9	18.05	16.00	0.00	* E- 9	26.74	-1.45	-0.80
* P- 10	20.05	16.00	0.00	* E- 10	28.60	-1.45	-0.80
* P- 11	24.05	16.00	0.00	* E- 11	34.92	-8.95	-0.80
* P- 12	36.05	16.00	0.00	* E- 12	34.92	-10.75	-0.80
* P- 13	4.05	-16.00	0.00				
* P- 14	12.05	-16.00	0.00				

CENTER OF SIP UNDER TILES  
ACCELEROMETERS (UNDER PANEL)

SYB NO.	X	Y	Z
* B- 1	16.90	-1.85	-0.93
* B- 2	15.32	-1.85	-0.93
* B- 3	16.90	-7.13	-0.93
* B- 4	15.32	-7.13	-0.93
* B- 5	26.74	-1.13	-0.93

TABLE III (Concluded)  
 X-Y POSITIONS FOR PRESSURE ORIFICES

SURFACE OF TILES				CAVITY BETWEEN SIP AND FILLER BAR			
SYB NO.	X	Y	Z	SYB NO.	X	Y	Z
* F- 1	5.12	7.95	0.00	# C- 1	9.52	6.95	-1.01
* F- 2	7.17	7.95	0.00	# C- 2	10.90	7.62	-1.01
* F- 3	8.24	8.33	0.00	# C- 3	12.67	7.62	-1.01
* F- 4	5.12	6.19	0.00	# C- 4	13.42	7.62	-1.01
* F- 5	7.17	6.19	0.00	# C- 5	15.32	7.62	-1.01
* F- 6	8.24	6.44	0.00	# C- 6	16.76	6.95	-1.01
* F- 7	5.12	-8.05	0.00	# C- 7	9.52	1.37	-1.01
* F- 8	7.17	-8.05	0.00	# C- 8	10.90	0.44	-1.01
* F- 9	8.24	-7.68	0.00	# C- 9	12.67	0.44	-1.01
* F- 10	9.72	7.95	0.00	# C- 10	13.74	0.44	-1.01
* F- 11	12.92	7.95	0.00	# C- 11	15.32	0.44	-1.01
* F- 12	13.74	7.95	0.00	# C- 12	16.70	1.37	-1.01
* F- 13	16.60	7.95	0.00	# C- 13	9.52	-1.45	-1.01
* F- 14	10.90	6.95	0.00	# C- 14	10.90	-0.44	-1.01
* F- 15	12.67	6.95	0.00	# C- 15	12.67	-0.44	-1.01
* F- 16	13.74	6.95	0.00	# C- 16	13.74	-0.44	-1.01
* F- 17	15.32	6.95	0.00	# C- 17	15.32	-0.44	-1.01
* F- 18	10.90	1.37	0.00	# C- 18	16.70	-1.45	-1.01
* F- 19	12.67	1.37	0.00	# C- 19	9.52	-6.65	-1.01
* F- 20	13.74	1.37	0.00	# C- 20	10.90	-7.62	-1.01
* F- 21	15.32	1.37	0.00	# C- 21	12.67	-7.62	-1.01
* F- 22	10.90	0.19	0.00	# C- 22	13.74	-7.62	-1.01
* F- 23	12.67	0.19	0.00	# C- 23	15.32	-7.62	-1.01
* F- 24	13.74	0.19	0.00	# C- 24	16.70	-6.65	-1.01
* F- 25	15.32	0.19	0.00	# C- 25	25.68	1.19	-1.01
* F- 26	17.92	8.13	0.00	# C- 26	26.74	0.44	-1.01
* F- 27	17.92	6.99	0.00	# C- 27	28.92	0.44	-1.01
* F- 28	17.92	1.37	0.00	# C- 28	25.68	-1.45	-1.01
* F- 29	17.92	0.25	0.00	# C- 29	26.74	-0.44	-1.01
* F- 30	17.92	-8.07	0.00	# C- 30	28.60	-0.44	-1.01
* F- 31	24.54	1.37	0.00	# C- 31	34.92	11.63	-1.01
* F- 32	24.54	-1.31	0.00	# C- 32	33.68	10.75	-1.01
* F- 33	31.62	9.19	0.00	# C- 33	33.68	9.19	-1.01
* F- 34	25.42	1.37	0.00	# C- 34	33.68	-8.95	-1.01
* F- 35	26.74	1.37	0.00	# C- 35	33.68	-10.75	-1.01
* F- 36	28.60	1.37	0.00	# C- 36	34.92	-11.63	-1.01
* F- 37	26.74	0.25	0.00				
* F- 38	28.60	0.25	0.00				
* F- 39	31.61	-10.75	0.00				
* F- 40	34.92	11.66	0.00				
* F- 41	33.43	10.75	0.00				
* F- 42	34.92	10.75	0.00				
* F- 43	36.72	10.75	0.00				
* F- 44	33.43	9.19	0.00				
* F- 45	34.92	9.19	0.00				
* F- 46	36.72	9.19	0.00				

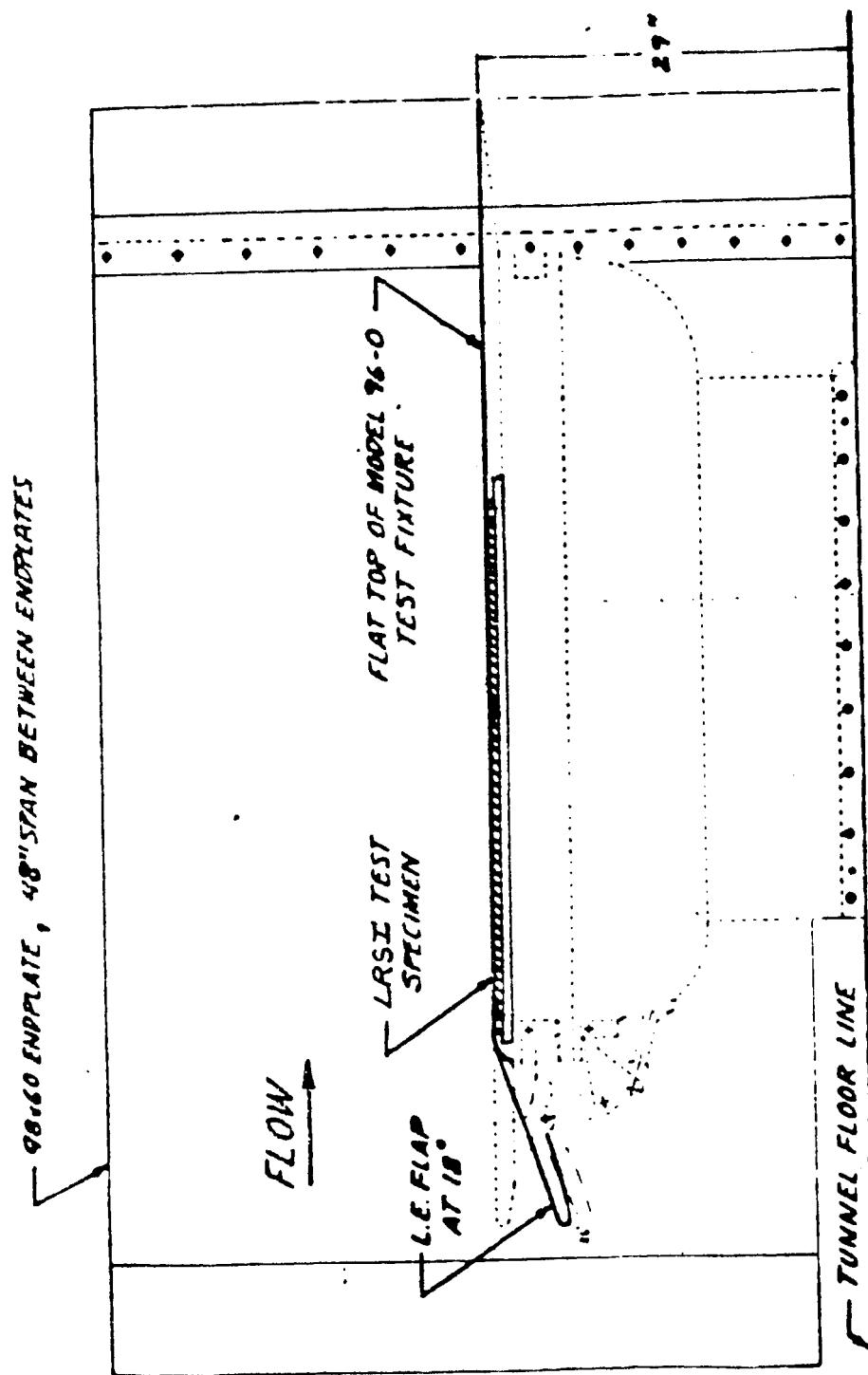


Figure 1a. Model 96-0 Test Fixture General Arrangement  
(OS41, OS42 and OS45)

TOP VIEW LPSI PANEL

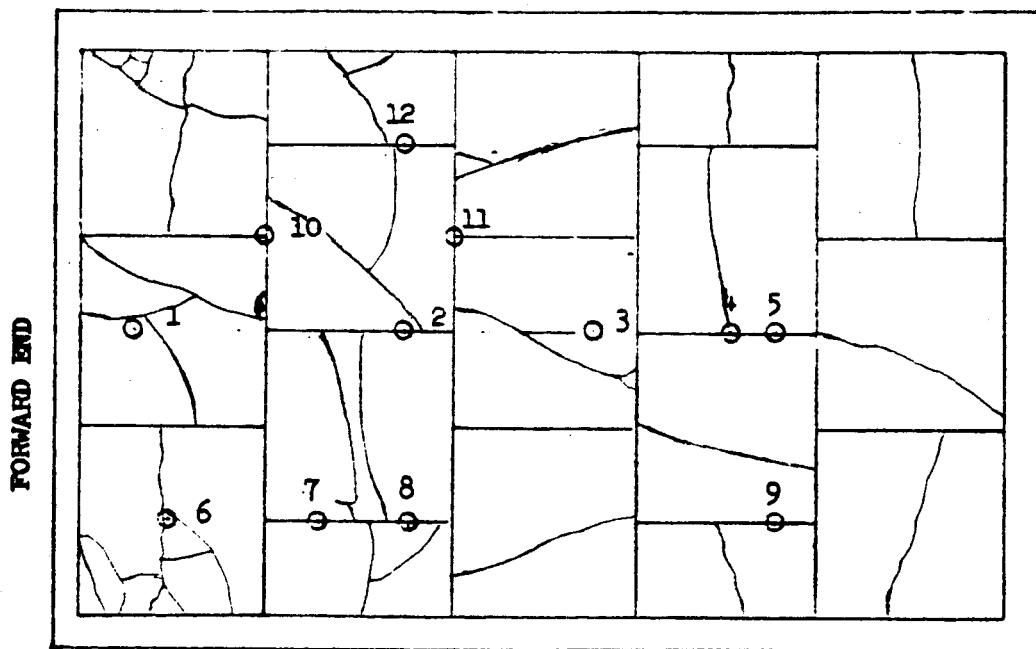


Figure 1b. Test OS41 Cracked Tile Configuration (Pretest)

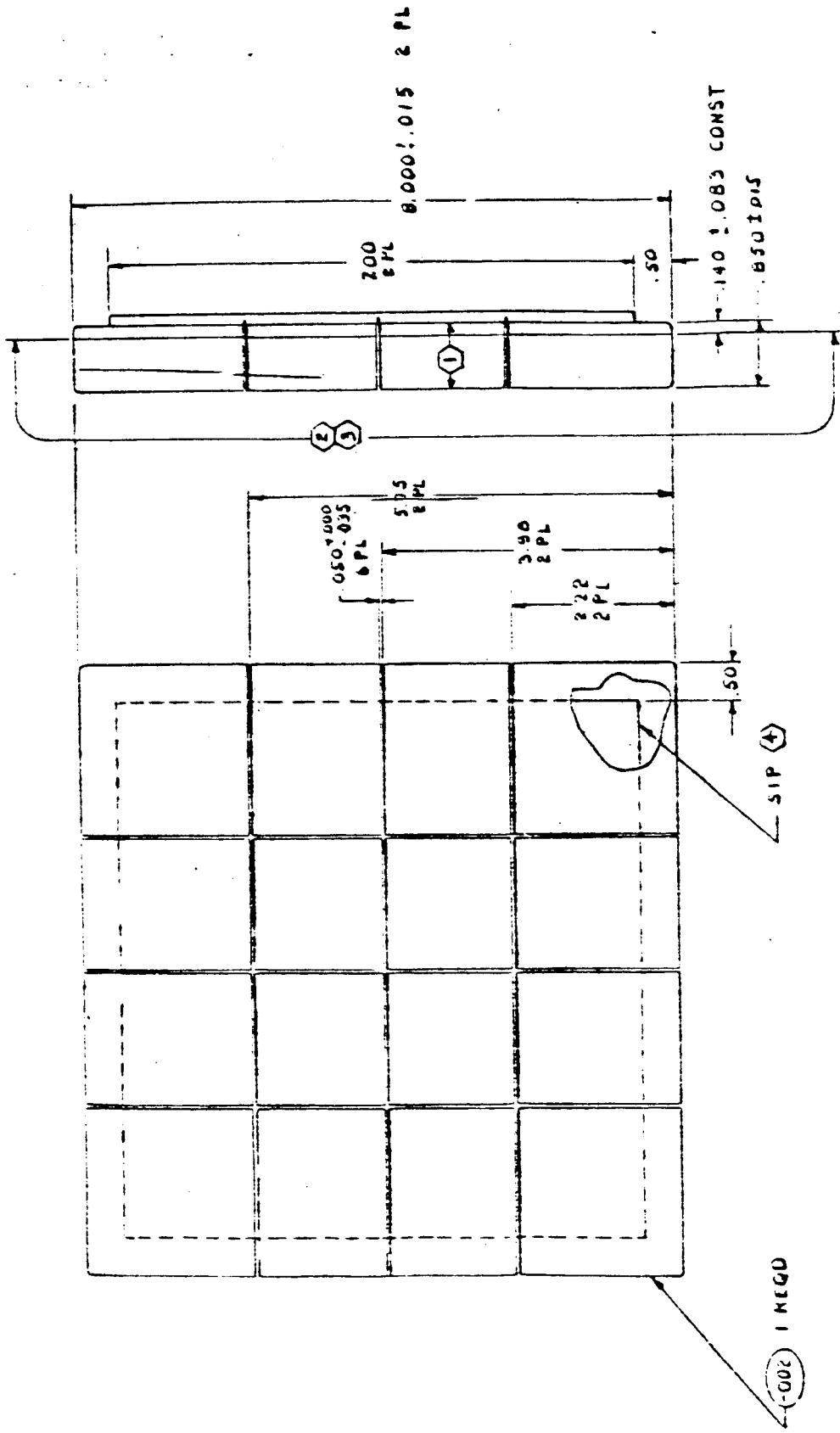
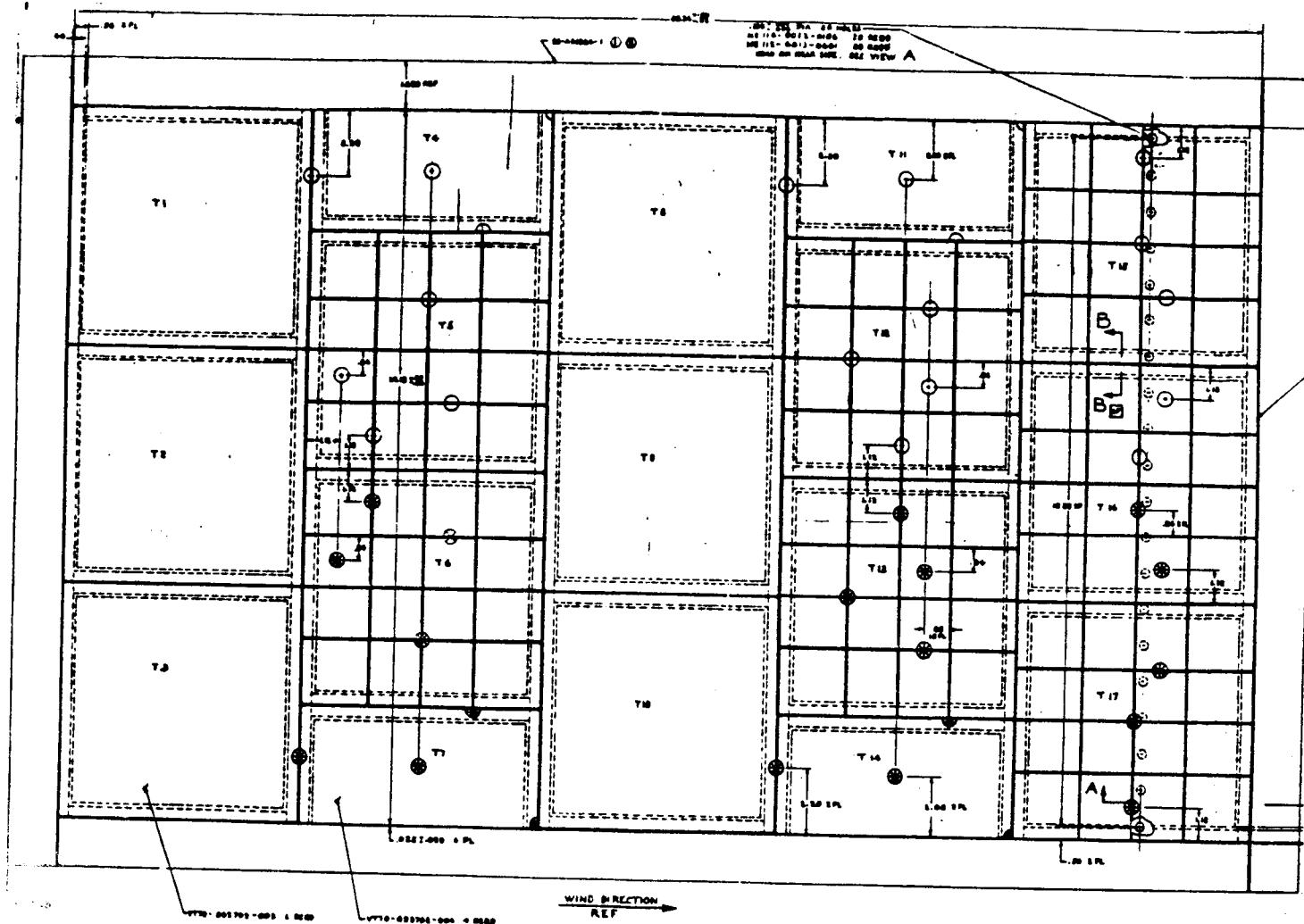


Figure 1c. Test OS42 and OS45  
Mini-Tile Configuration



VIEW LOOKING DOWN ON THE TOP OF THE TILE PANEL



Star Crack



Chip



Simulated Rivet Head

Figure 1d. Test OS42 LRSI  
Tile Panel

# WIND TUNNEL TEST (OS45)

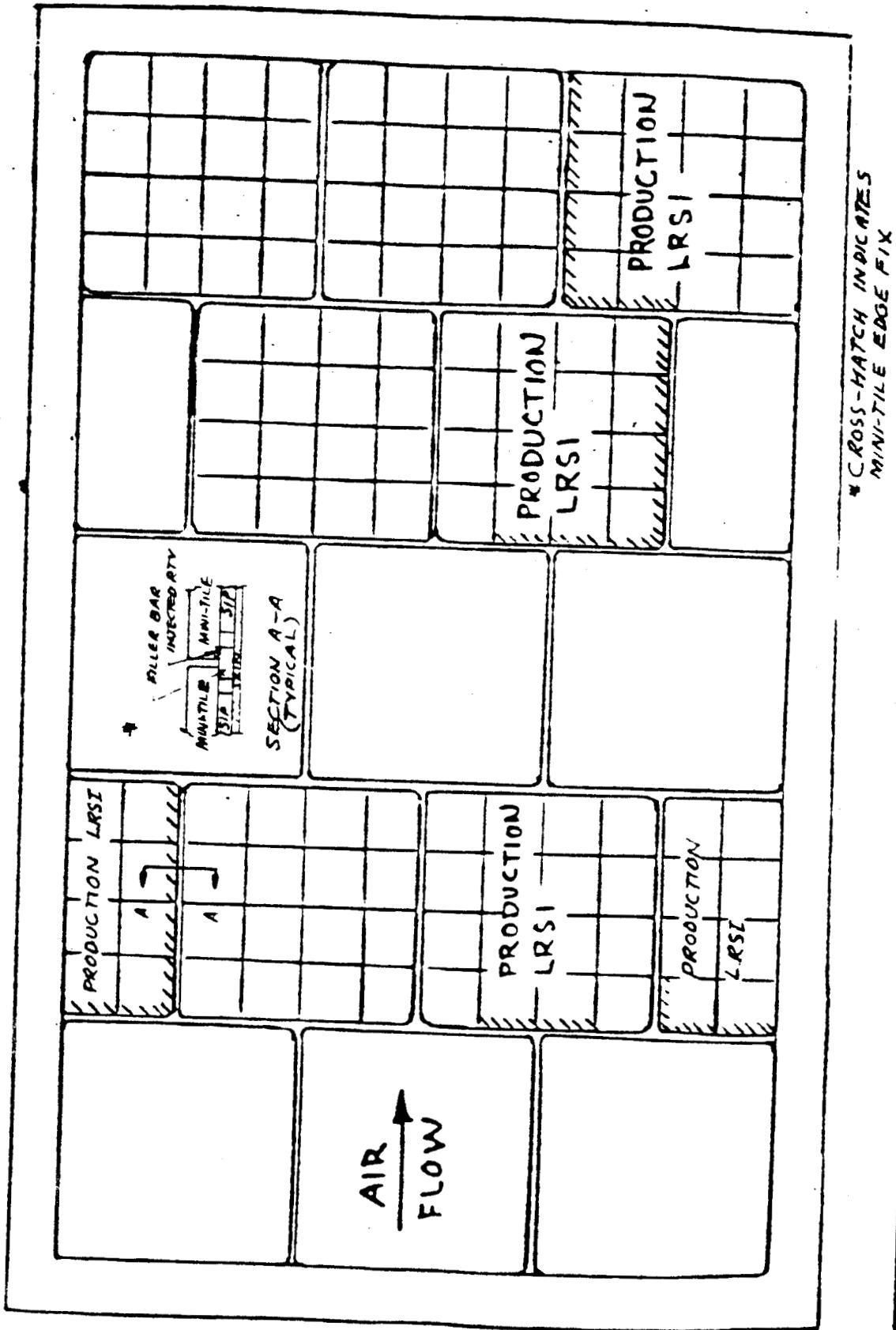


Figure 1e. 5 Production LRSI Tile Locations  
for Test OS45

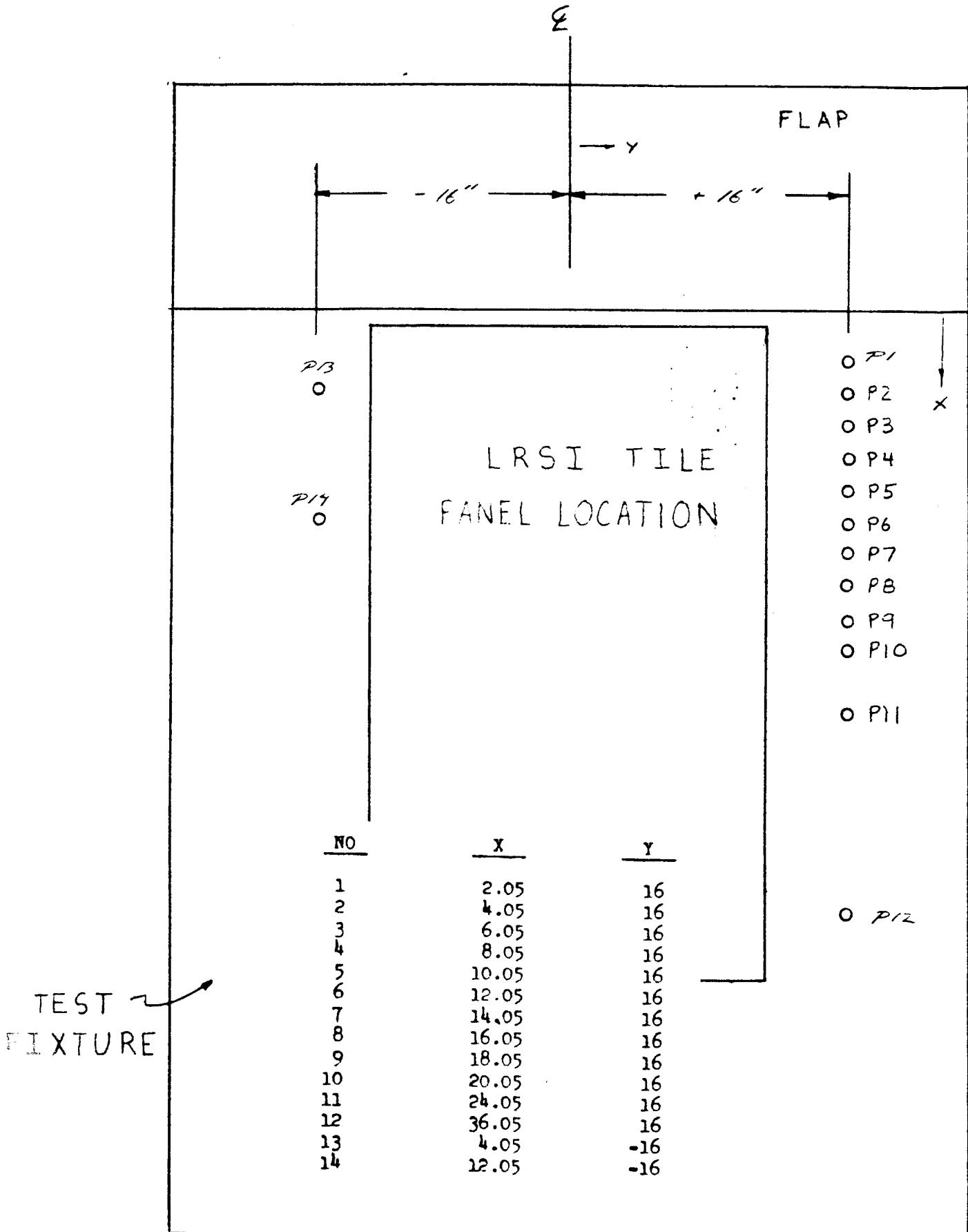
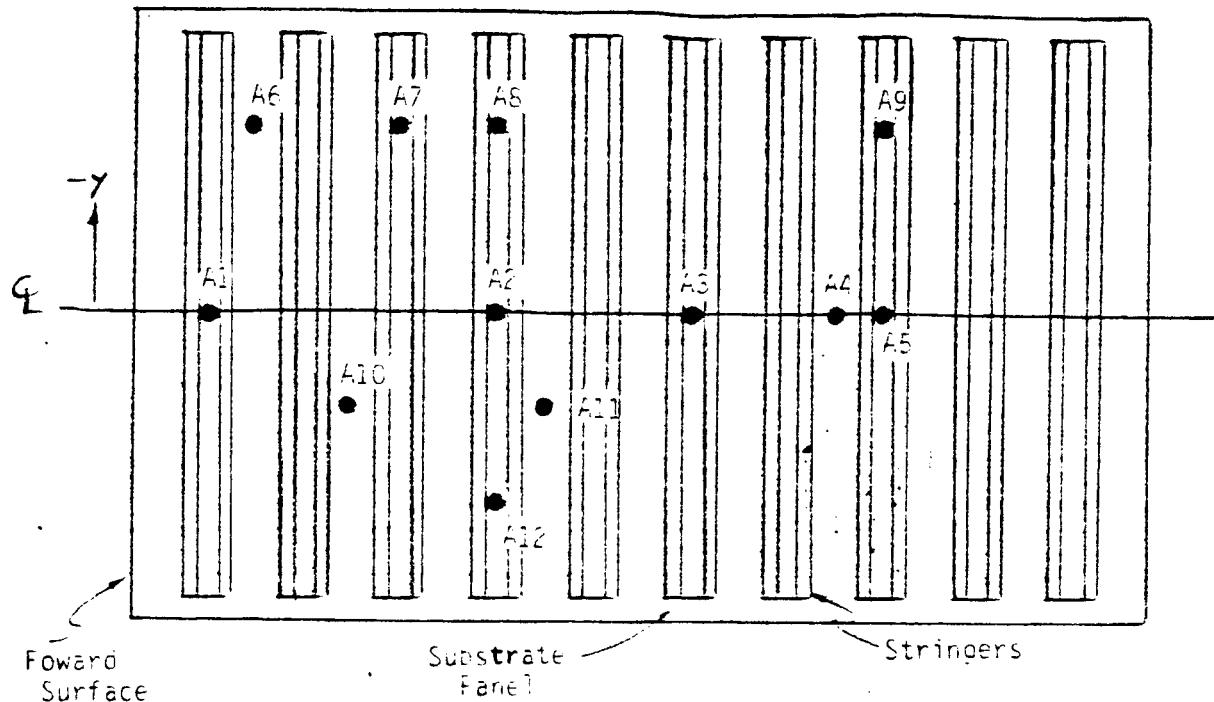


Figure 1f. Test Fixture Instrumentation  
for Tests OS41, OS42 and OS45



VIEW LOOKING UP AT THE BOTTOM OF THE PANEL

← Locations of the 12 Substrarte Panel Accelerometers

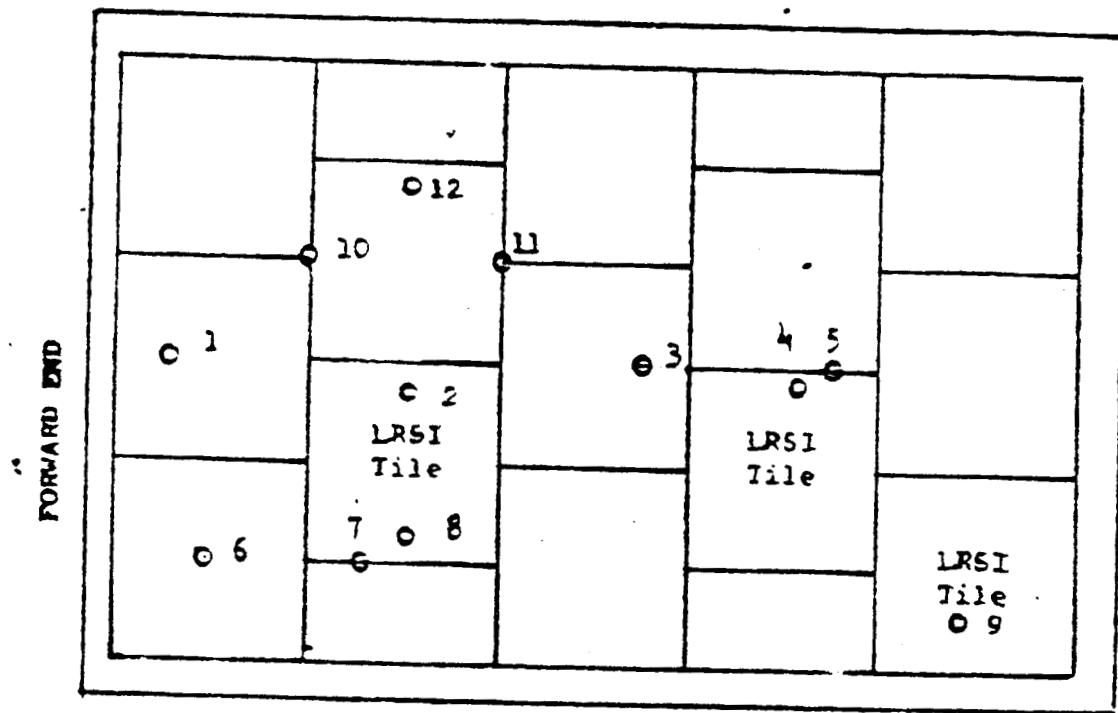
Accelerometers are located on Stringers or between Stringers as shown.

NO	X	Y	Location
1	3.17	0	On Stringer #1, On Centerline
2	15.17	0	On Stringer #4, On Centerline
3	23.17	0	On Stringer #6, On Centerline
4	29.17	0	Between Stringers #7 and #8, on Centerline
5	31.17	0	On Stringer #8, On Centerline
6	5.17	-5	Between Stringers #1 and #2, 8 Inches Left
7	11.17	-5	On Stringer #3, 8 Inches Left
8	15.17	-5	On Stringer #4, 8 Inches Left
9	31.19	-5	On Stringer #5, 8 Inches Left
10	9.17	4	Between Stringers #2 and #3, 4 Inches Right
11	17.17	4	Between Stringers #4 and #5, 4 Inches Right
12	15.17	9	On Stringer #4, 8 Inches Right

Figure 1g. LRSI Tile Panel Subsurface Accelerometer Instrumentation

## TEST OS45

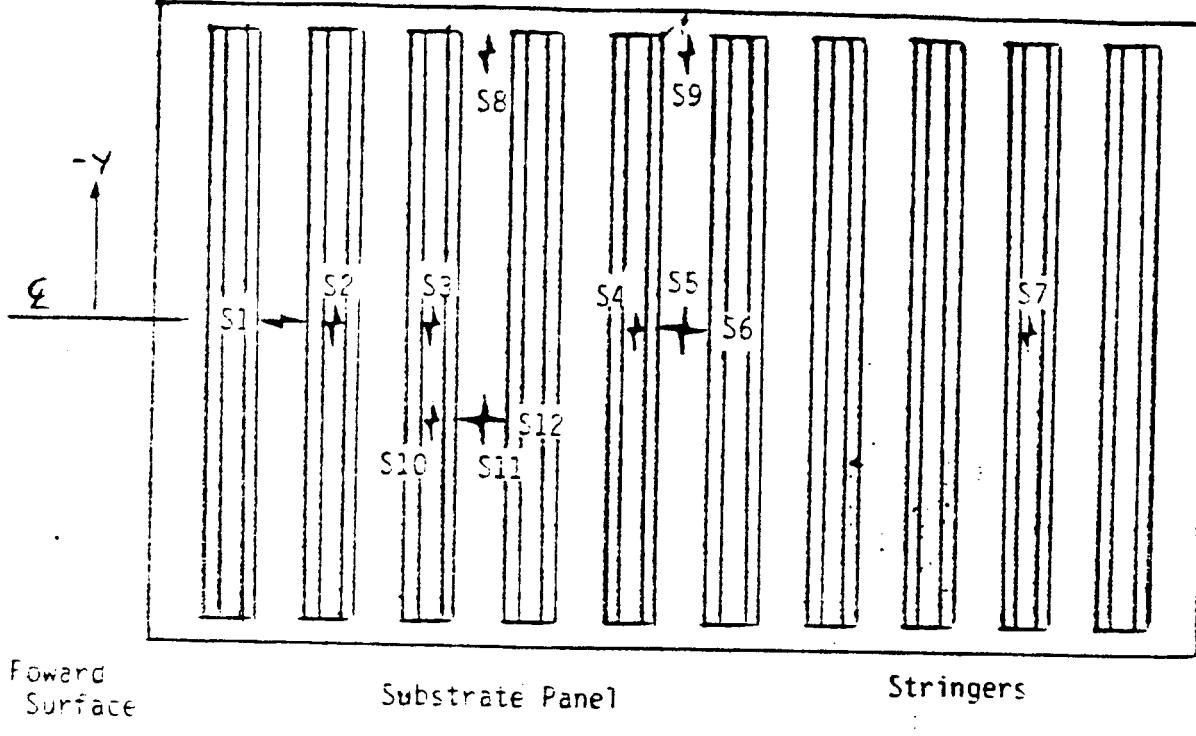
## TOP VIEW LRSI PANEL



NO	X	Y	
1	3.17	0	On Stringer #1, On Centerline
2	13.11	-.95	Between Stringers #2 & #4, 1 inch left
3	23.17	0	On Stringer #6, On Centerline
4	29.67	-.25	Between Stringers #7 and #8, 1.5 inches from Stringer #8 Centerline, .25 inches left
5	31.17	0	On Stringer #8, On Centerline
6	5.17	-8	Between Stringers #1 and #2, 8 inches left
7	11.17	-8	On Stringer #3, 8 inches left
8	13.11	-7.13	Between Stringers #3 and #4, 7.13 inches left
9	36.70	-9.45	Between Stringer #9 and #10, 2.47 from Stringer #10 Centerline, 9.45 inches left
10	9.17	4	Between Stringers #2 and #3, 4 inches right
11	17.17	4	Between Stringers #4 and #5, 4 inches right
12	13.11	7.25	Between Stringers #3 and #4, 7.25 inches right

Accelerometers are attached on the bottom surface of the panel

Figure 1h. LRSI Panel Accelerometer Locations



VIEW LOOKING UP AT THE BOTTOM OF THE PANEL

Location and Orientation of Substrate Strain Gages

Strain Gages are located on Stringers or between Stringers as shown.

NO	X	Y	Location
1	5.17*	0	Between Stringers #1 and #2, On Center Line
2	7.17	0*	On Stringer #3, On Center line
3	11.17	0*	On Stringer #3, On Center Line
4	19.17	0*	On Stringer #5, On Center Line
5	21.17	0*	Between Stringers #5 and #6, On Center Line
6	21.17*	0	Between Stringers #5 and #6, On Center Line
7	35.17	0*	On Stringer #9, on Center Line
8	13.17	-11*	Between Stringers #3 and #4, 11 Inches Left
9	21.17	-11*	Between Stringers #5 and #6, 11 Inches Left
10	11.17	4*	On Stringer #3, 4 Inches Right
11	13.17	4*	Between Stringers #3 and #4, 4 Inches Right
12	13.17*	4	Between Stringers #3 and #4, 4 Inches Right

\*Active Axis of Gage

Figure 11. LRSI Tile Panel Subsurface Strain Gage Instrumentation

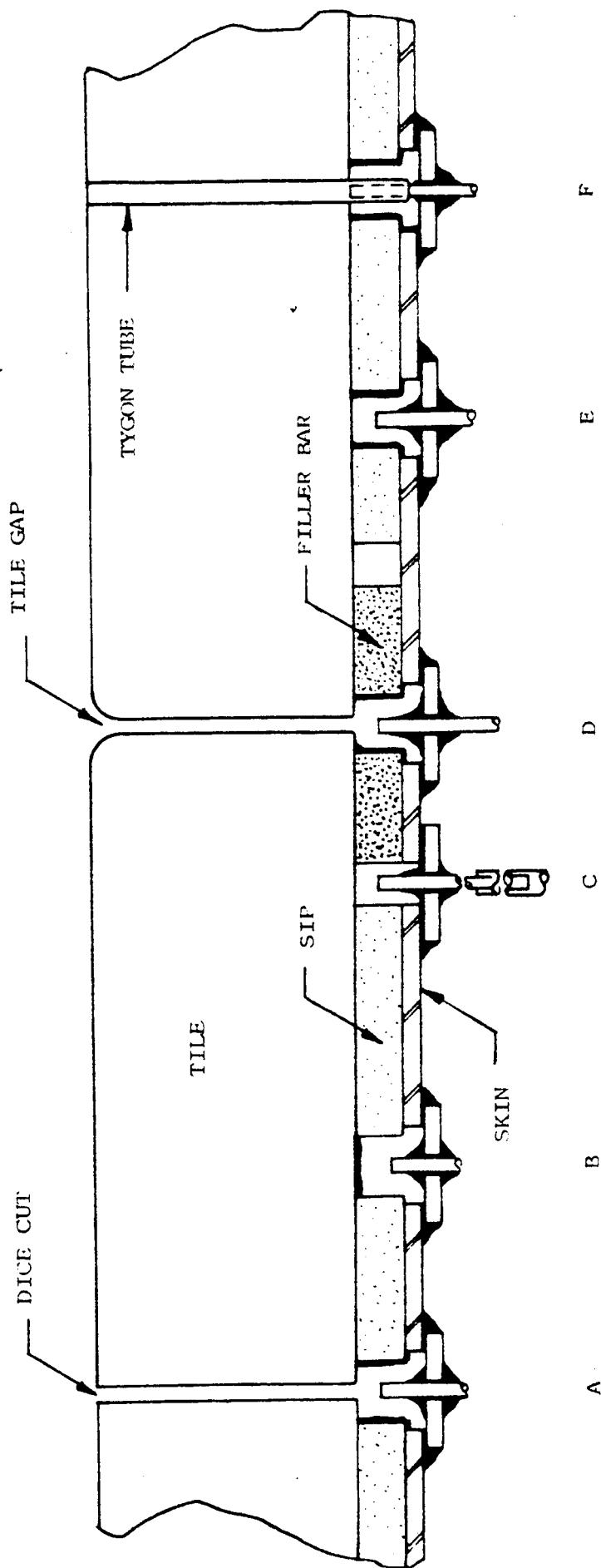
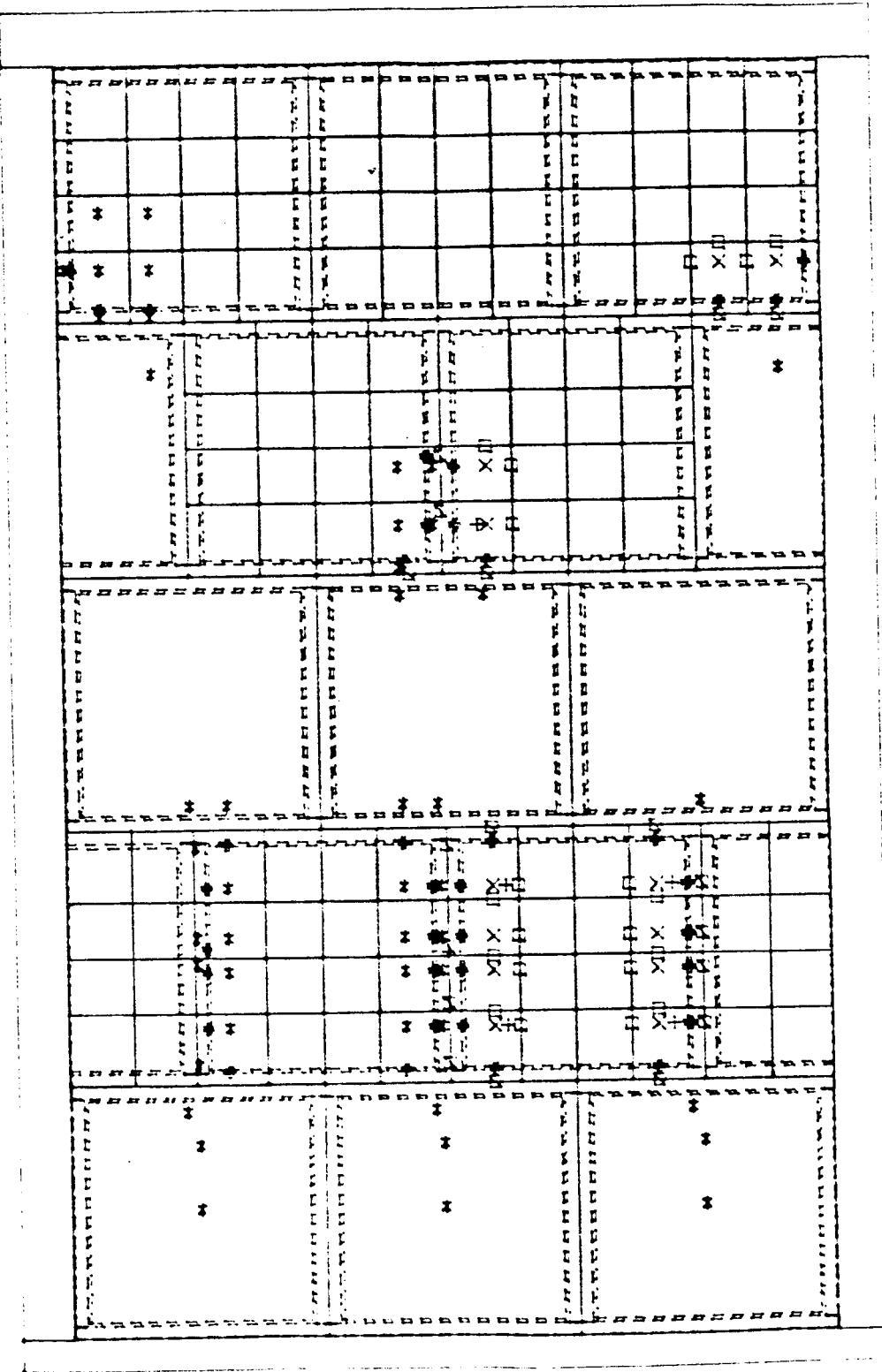


FIGURE 1j

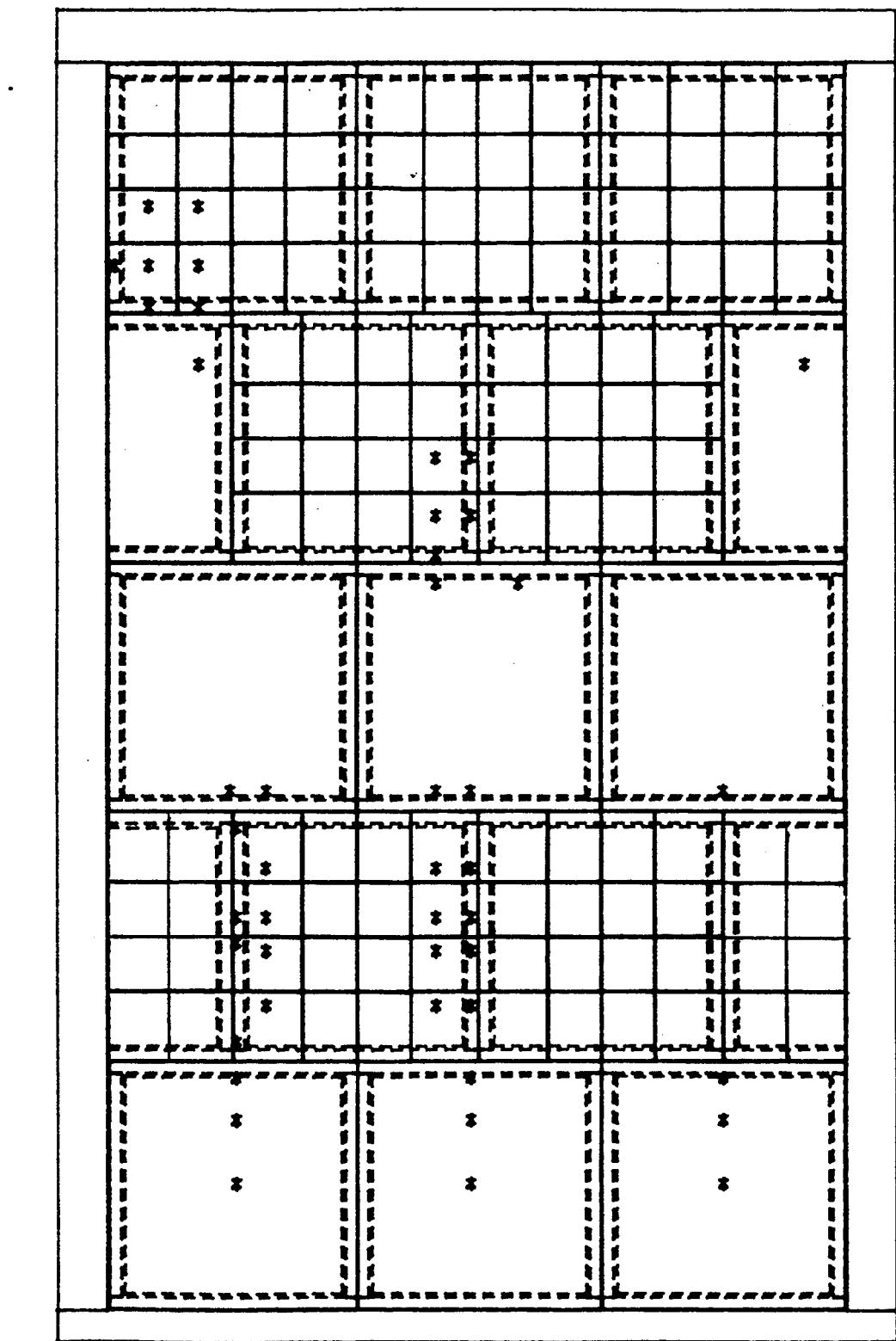
6 Different Pressure Tap Mountings  
used during Test OS45



See Table III  
for symbol code.

FIGURE 1k

All Pressure Orifices on the  
LRSI Panel for Test OS45

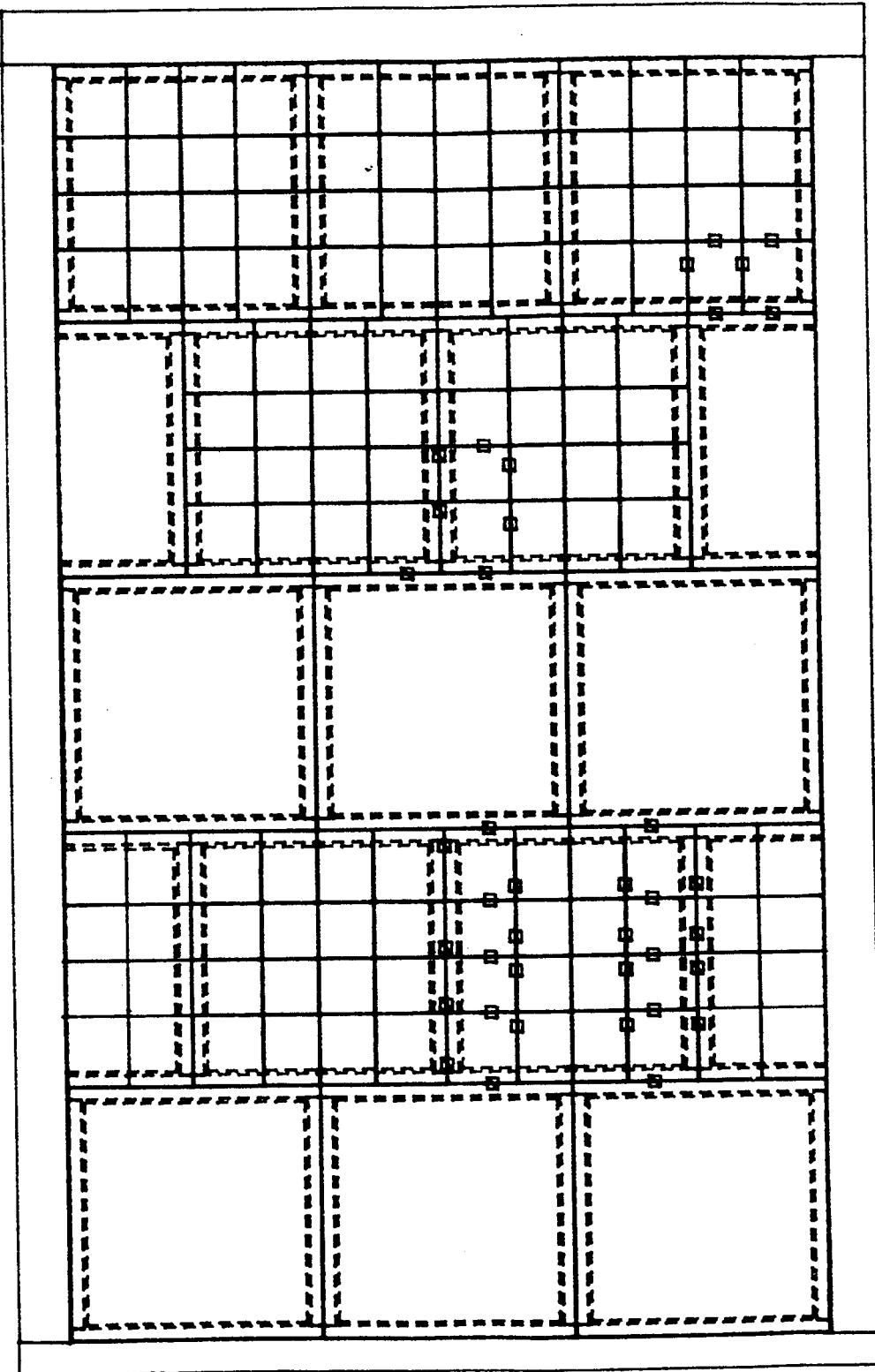


See Table III  
for symbol code

\* = F AND P PRESSURE ORIFICES - SURFACE  
OF TILES AND ON SURFACE OF FIXTURE

Pressure Orifice Locations on the LRSI  
Panel for Test OS45

FIGURE 11

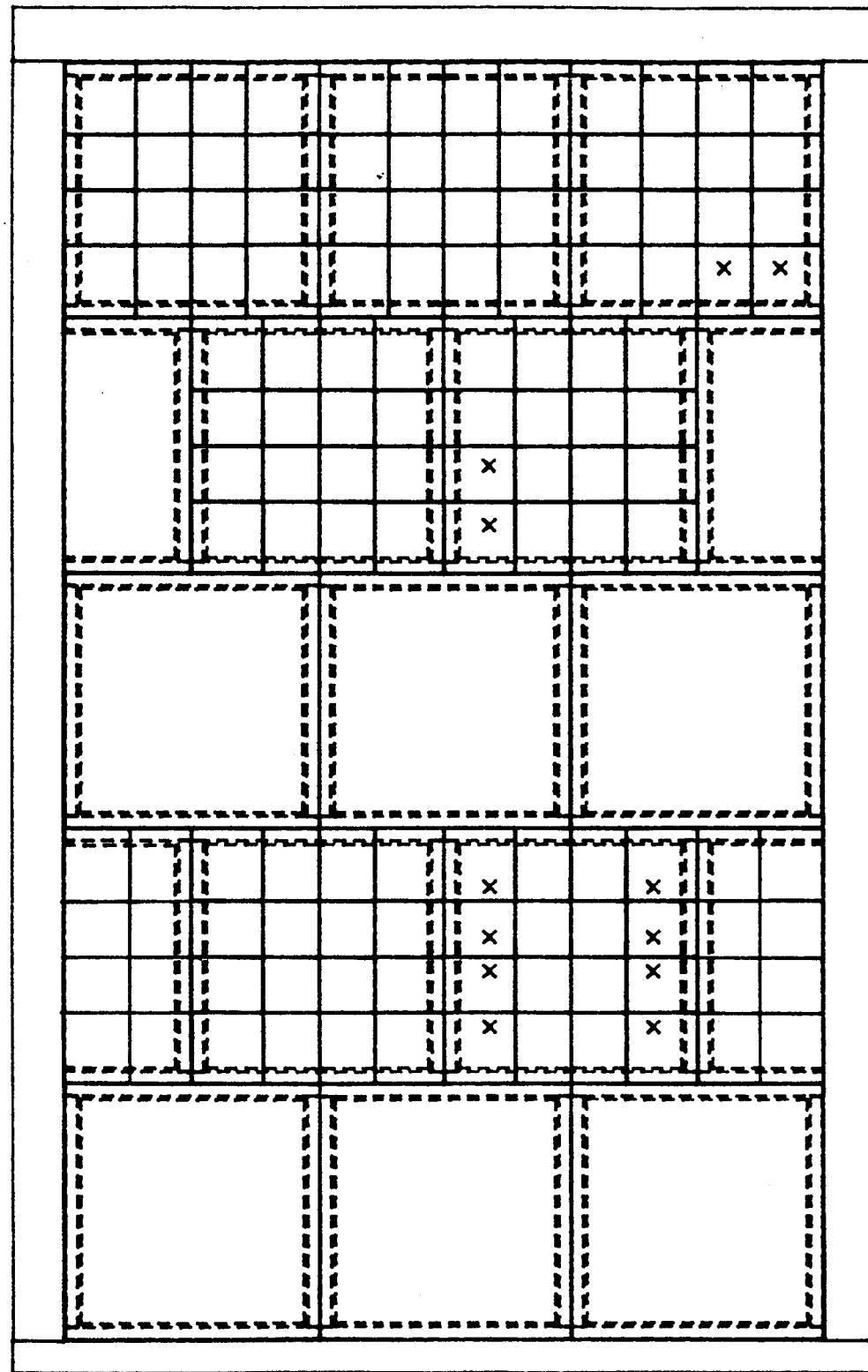


See Table III  
for symbol code.

FIGURE 1m

▀ = D PRESSURE ORIFICES - GAP BETWEEN TILES  
□ = A PRESSURE ORIFICES - GAP BETWEEN DICED TILES

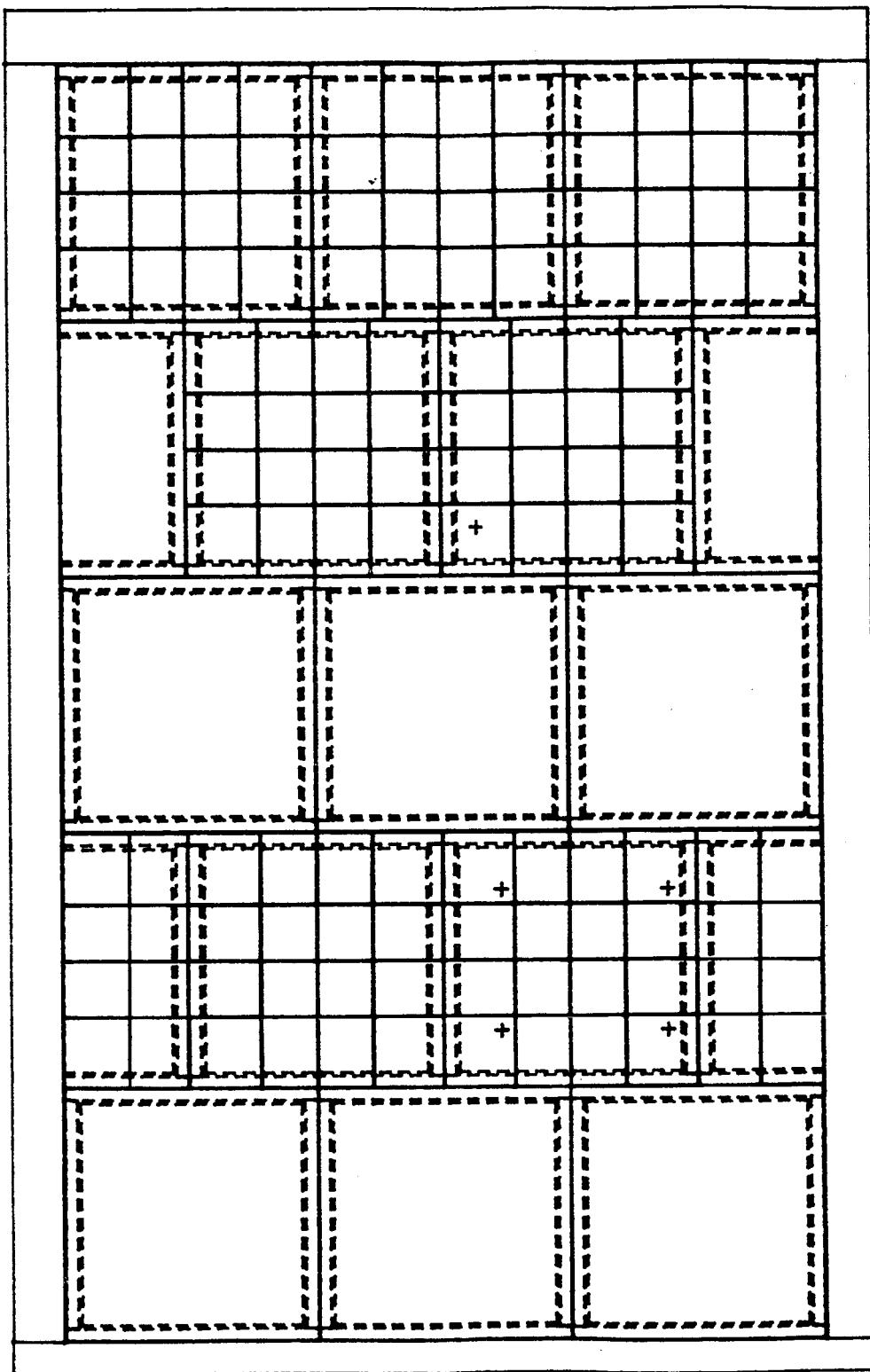
Pressure Orifice Locations on the  
LRSI Panel for Test OS45



See Table III  
for symbol code

FIGURE 1n  
X = E PRESSURE ORIFICES - INSIDE AT BOTTOM OF TILES

Pressure Orifice Locations on the  
LRSI Panel for Test OS45

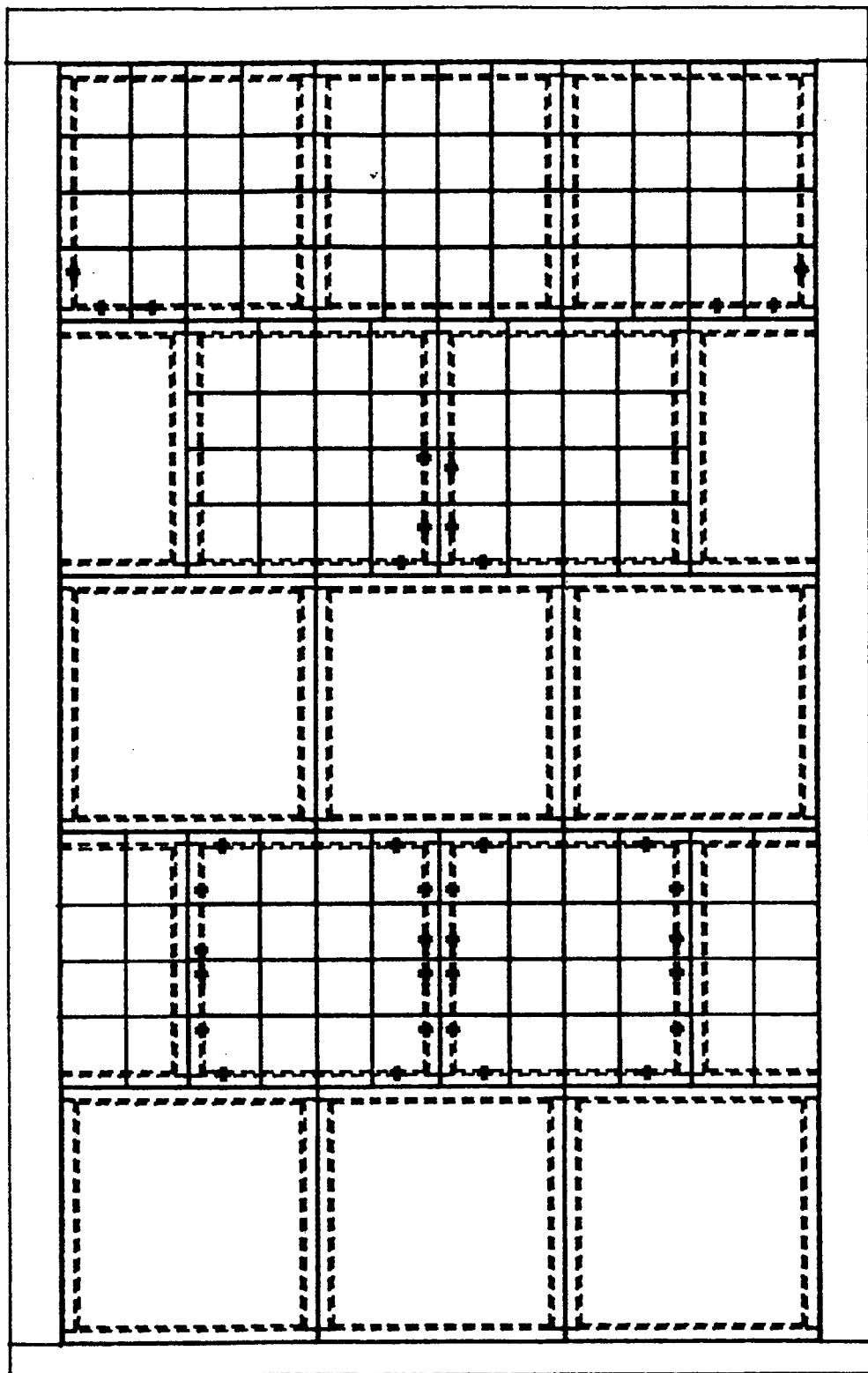


See Table III  
for symbol code

FIGURE 10

+ = B PRESSURE ORIFICES - CENTER OF SIP, UNDER THIS

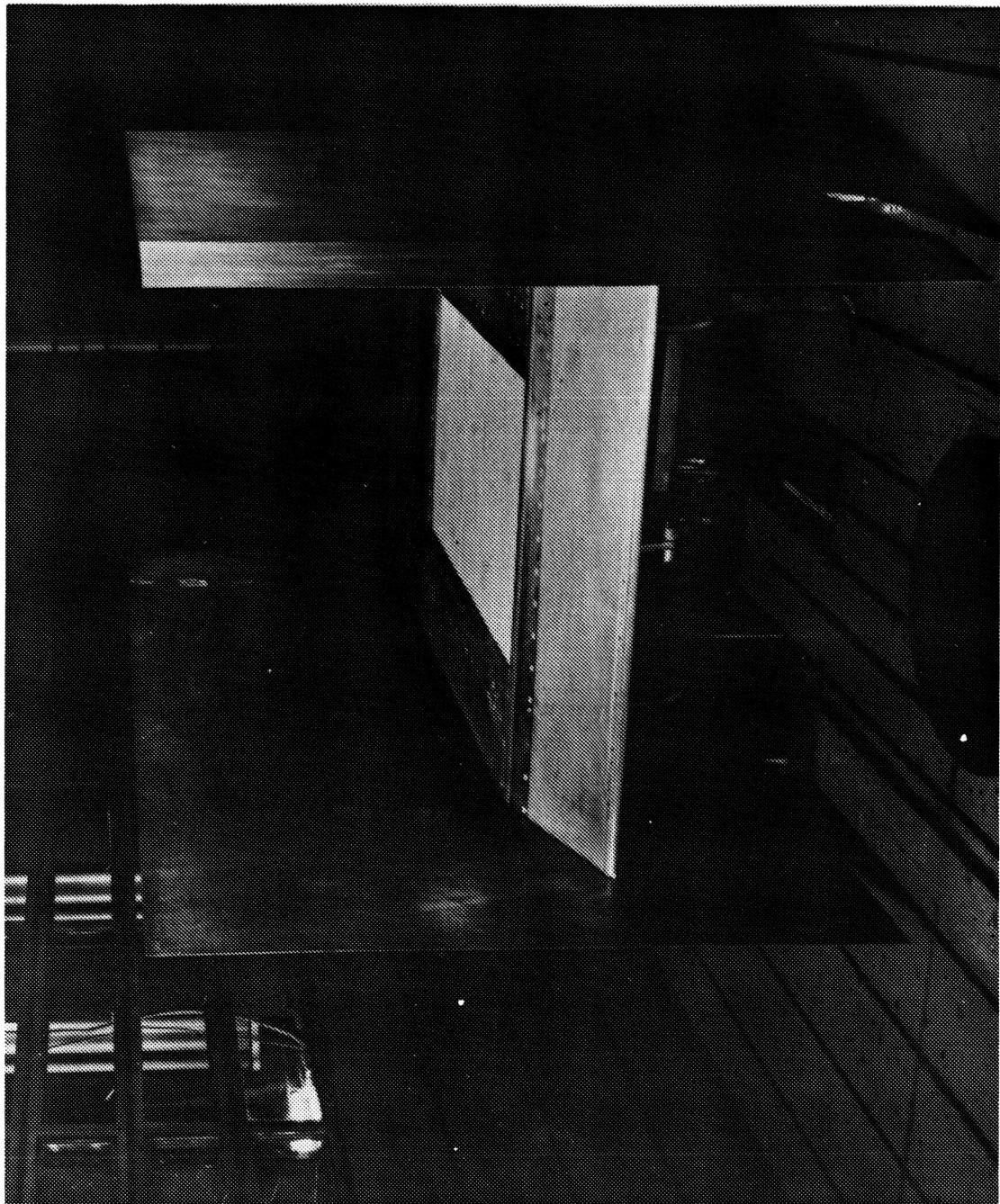
Pressure Orifice Locations on the  
LRSI Panel for Test OS45



See Table III  
for symbol code

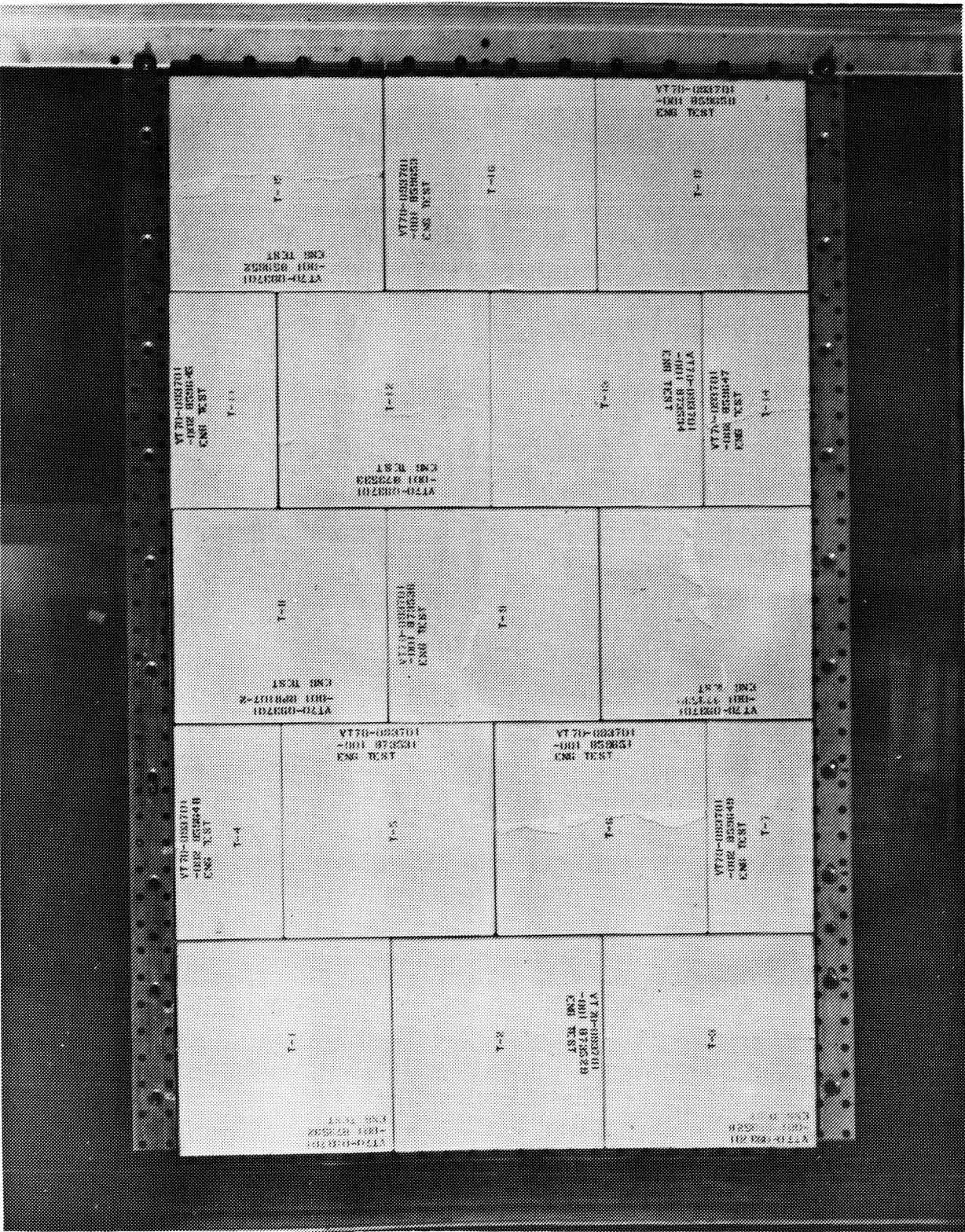
FIGURE 1p

# = C PRESSURE ORIFICES - CAVITY BETWEEN STEP AND FILTER PAR  
Pressure Orifice Locations on the  
LRSI Panel for Test OS45



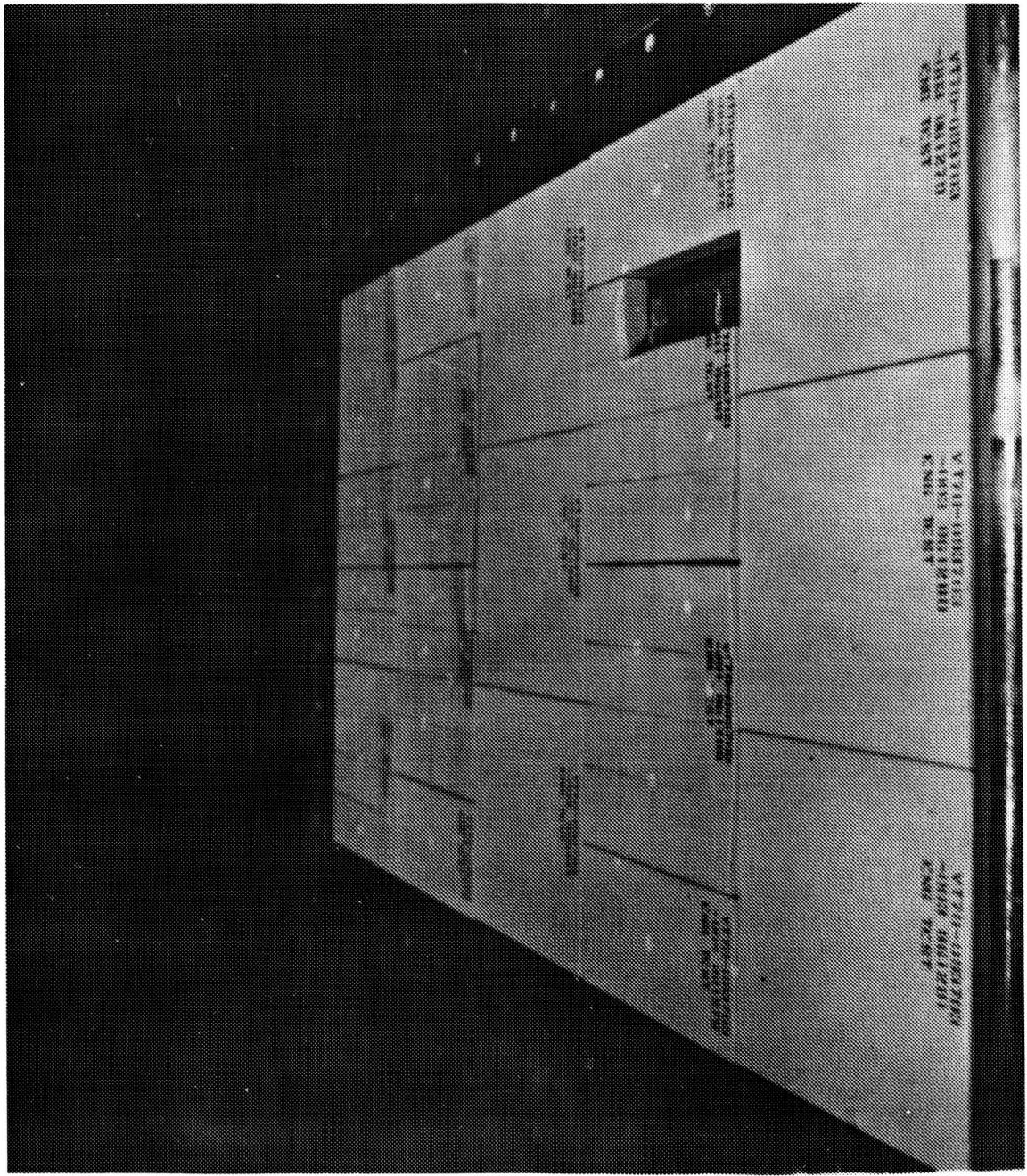
a. Model 107-0 Installed in the 96-0 Test Fixture in  
the ARC 11x11-Foot Wind Tunnel

Figure 2. Model Photographs



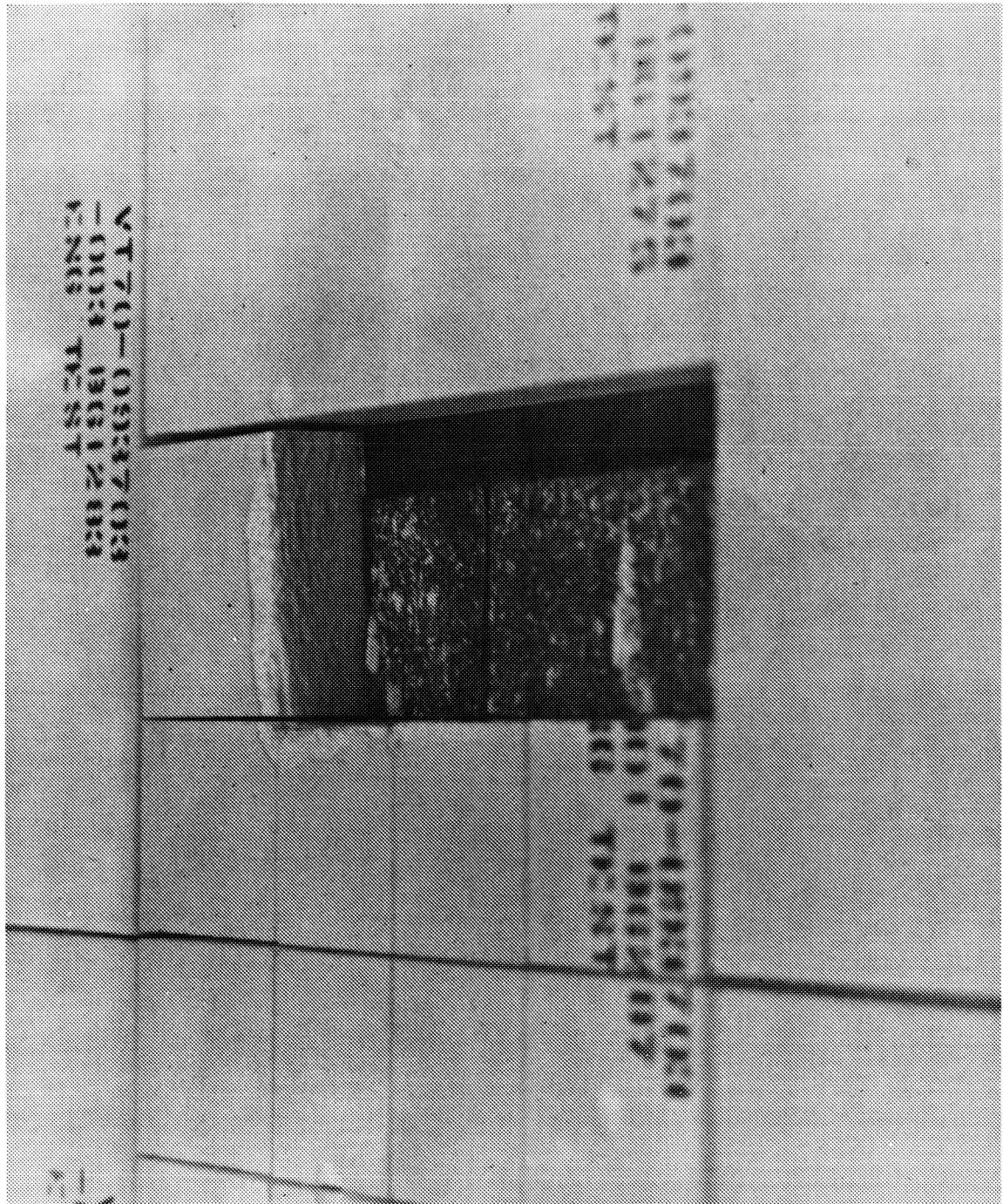
b. Post-Test Photograph of the LRSI Test Specimen  
for Test 0S41

Figure 2 (Continued)



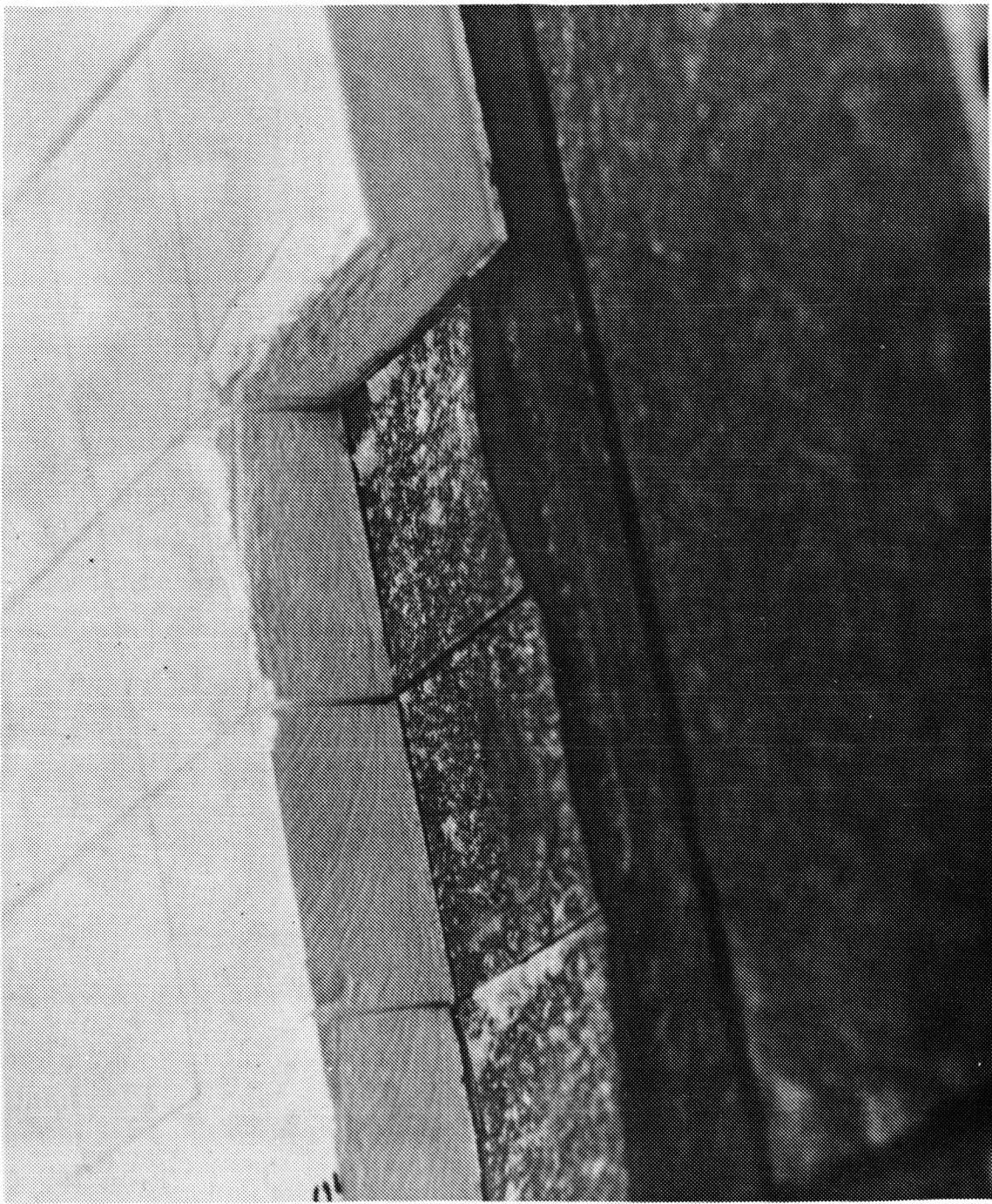
c. Post-Test Photograph of the LRSI Test Specimen  
for Test OS42

Figure 2 (Continued)



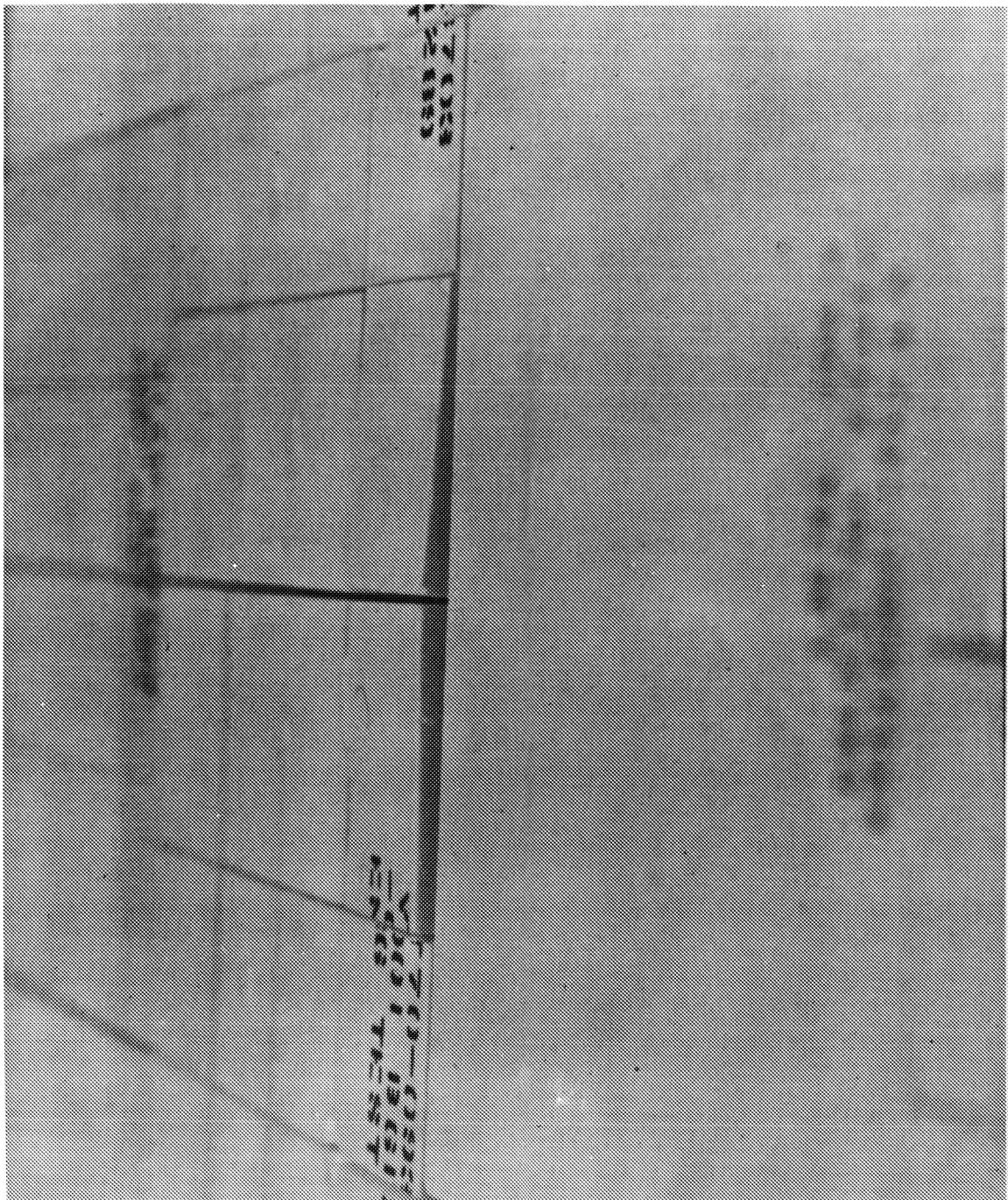
d. Post-Test Photograph of the Mini-Tile Damage on the LRSI Test Specimen for Test OS42

Figure 2 (Continued)



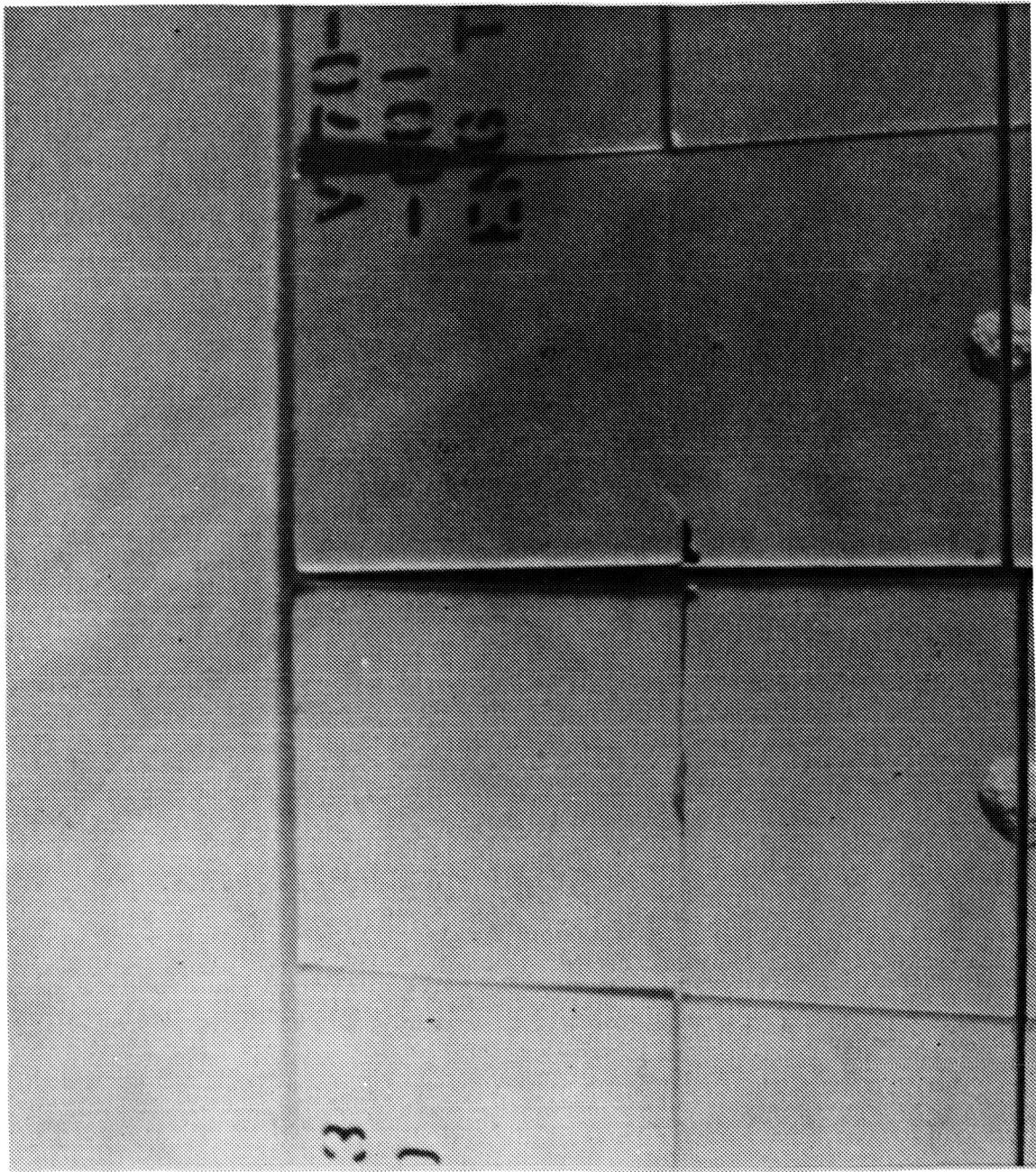
e. Post-Test Photograph of the Mini-Tile Damage on  
the LRSI Test Specimen for Test OS42

Figure 2 (Continued)



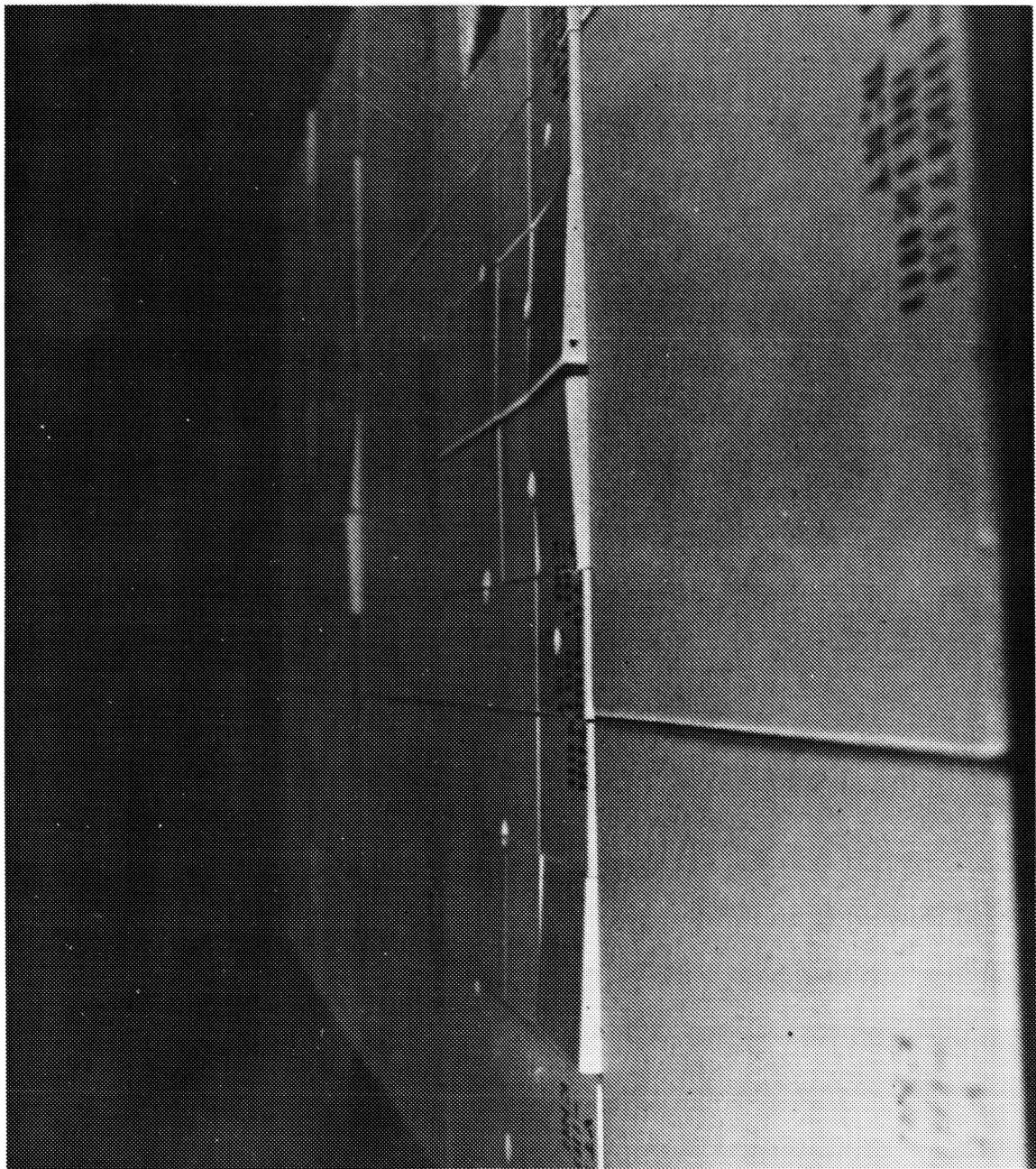
f. Post-Test Photograph of the Mini-Tile SIP Extension  
on the LRSI Test Specimen for Test OS42

Figure 2 (Continued)



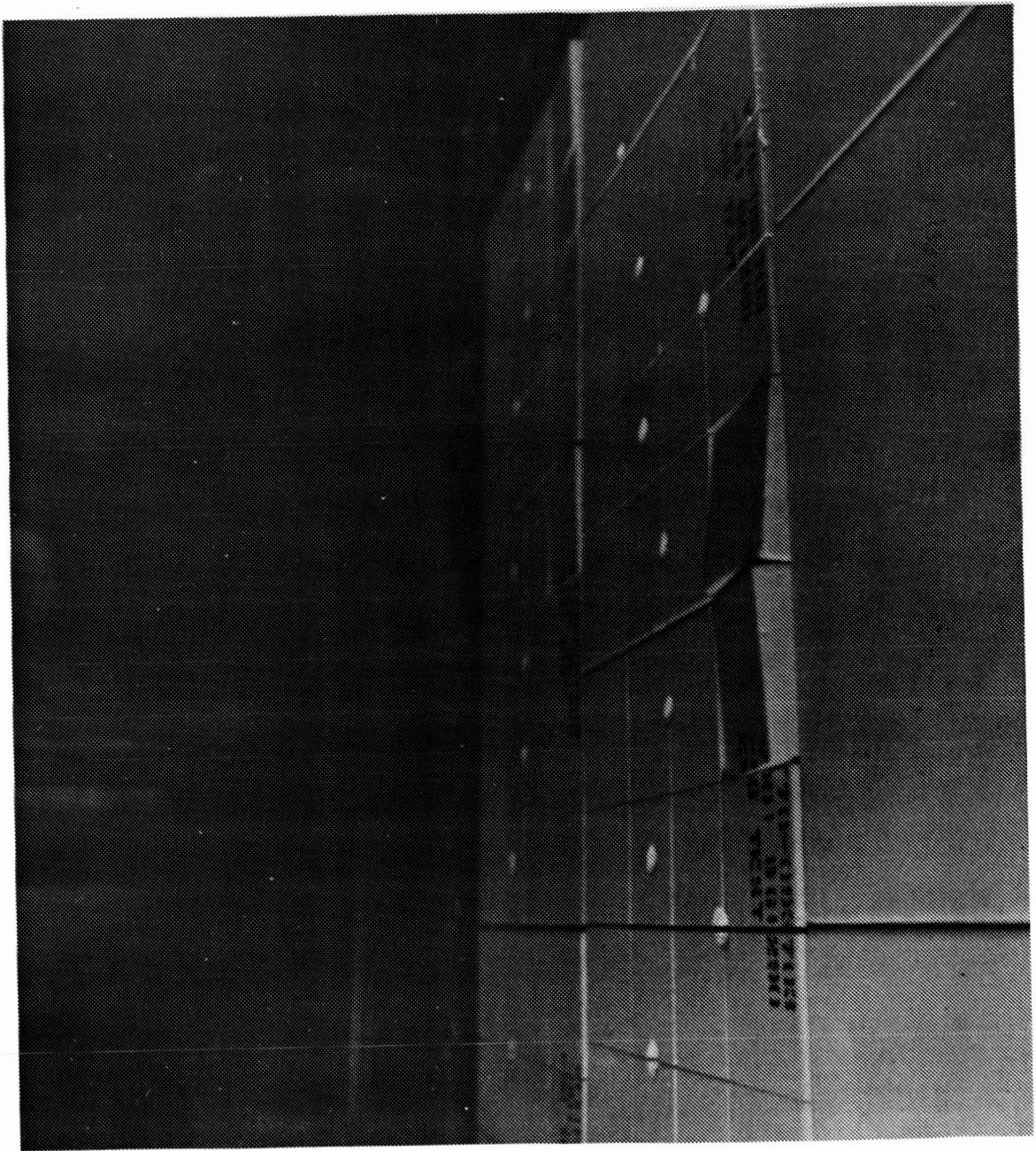
g. Post-Test Photograph of the Mini-Tile Gaps on the  
LRSI Test Specimen for Test OS42

Figure 2 (Continued)



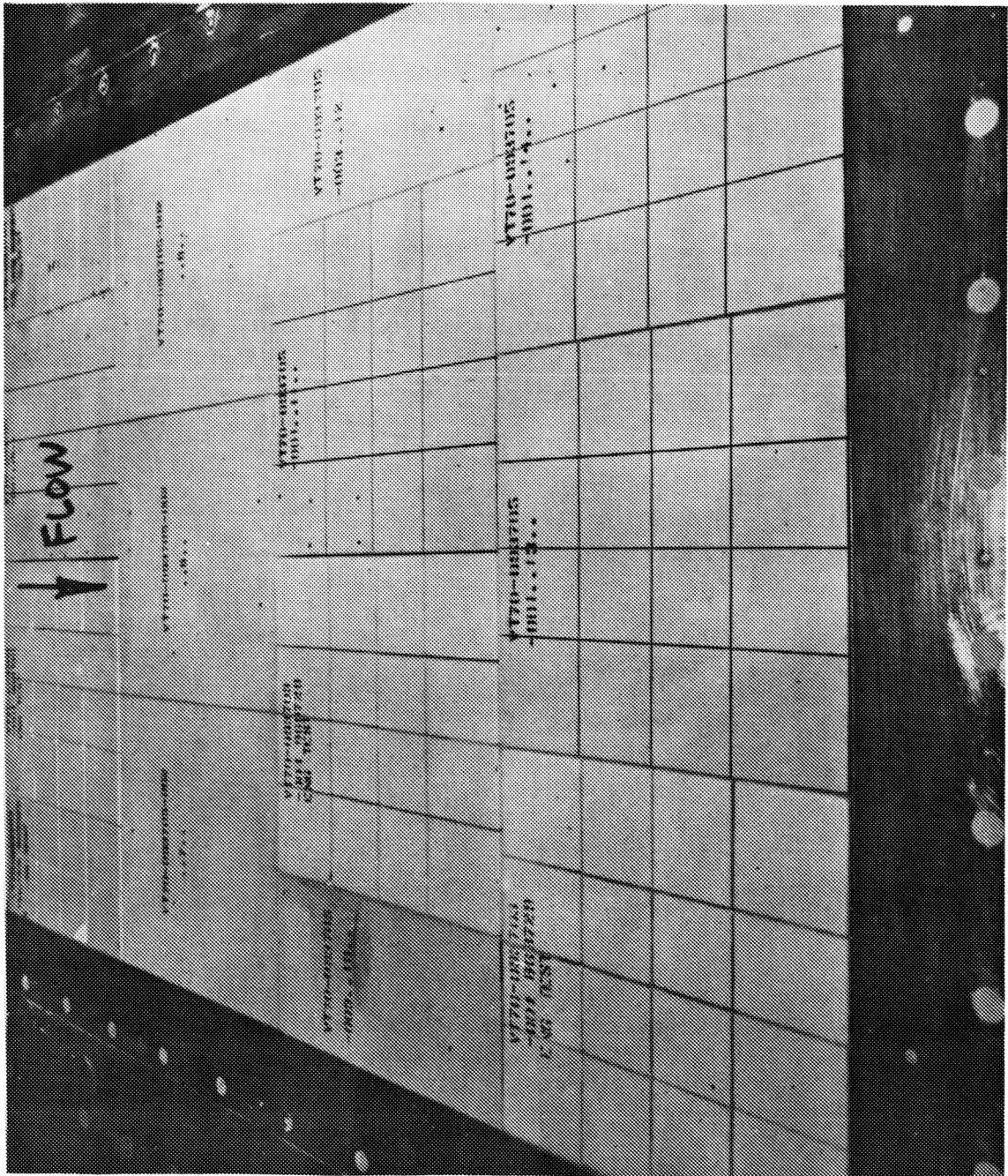
h. Post-Test Photograph of the Mini-Tile SIP Extension  
on the LRSI Specimen for Test OS42

Figure 2 (Continued)



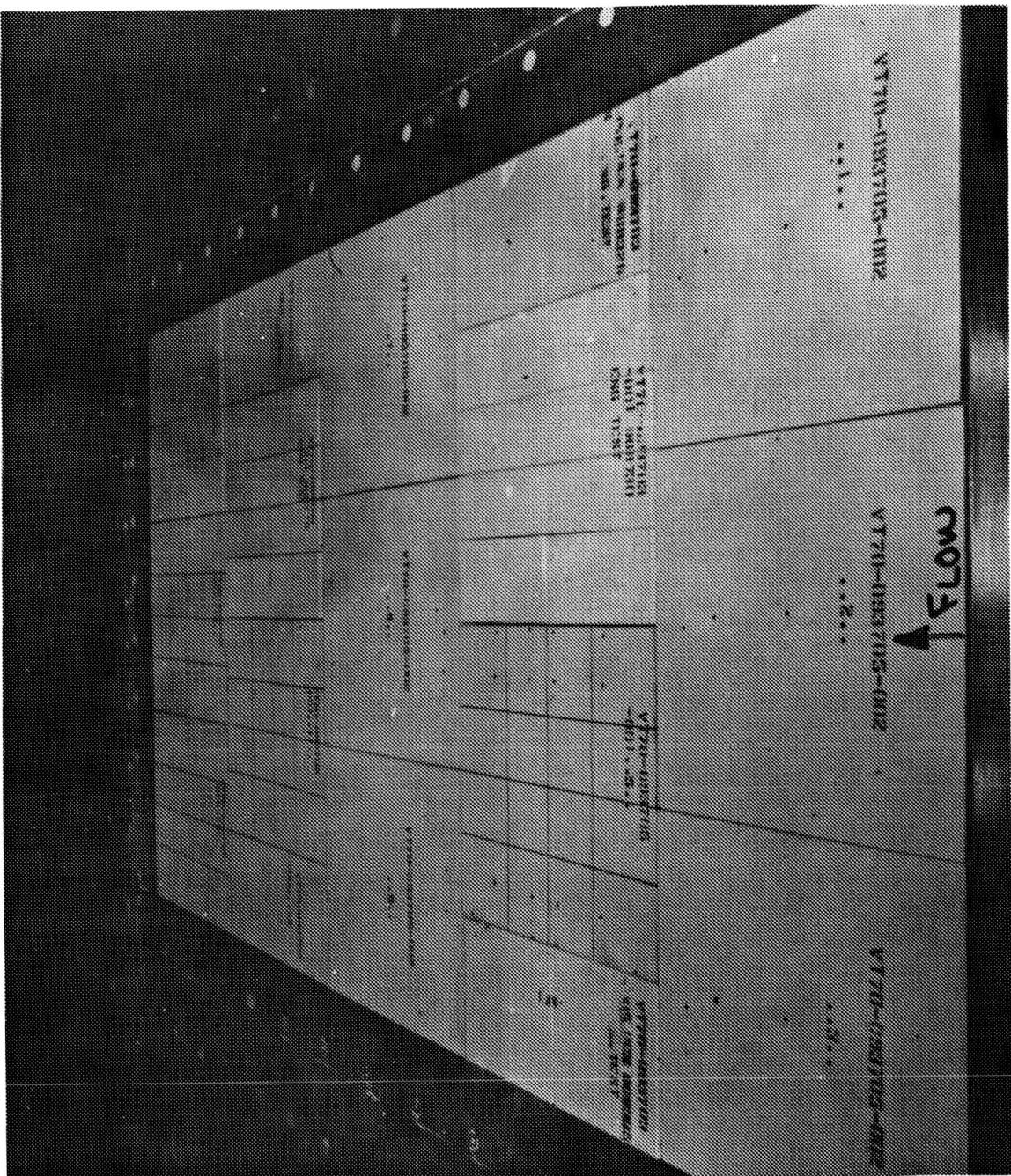
i. Post-Test Photograph of the Mini-Tile SIP Extension  
on the LRSI Specimen for Test OS42

Figure 2 (Continued)



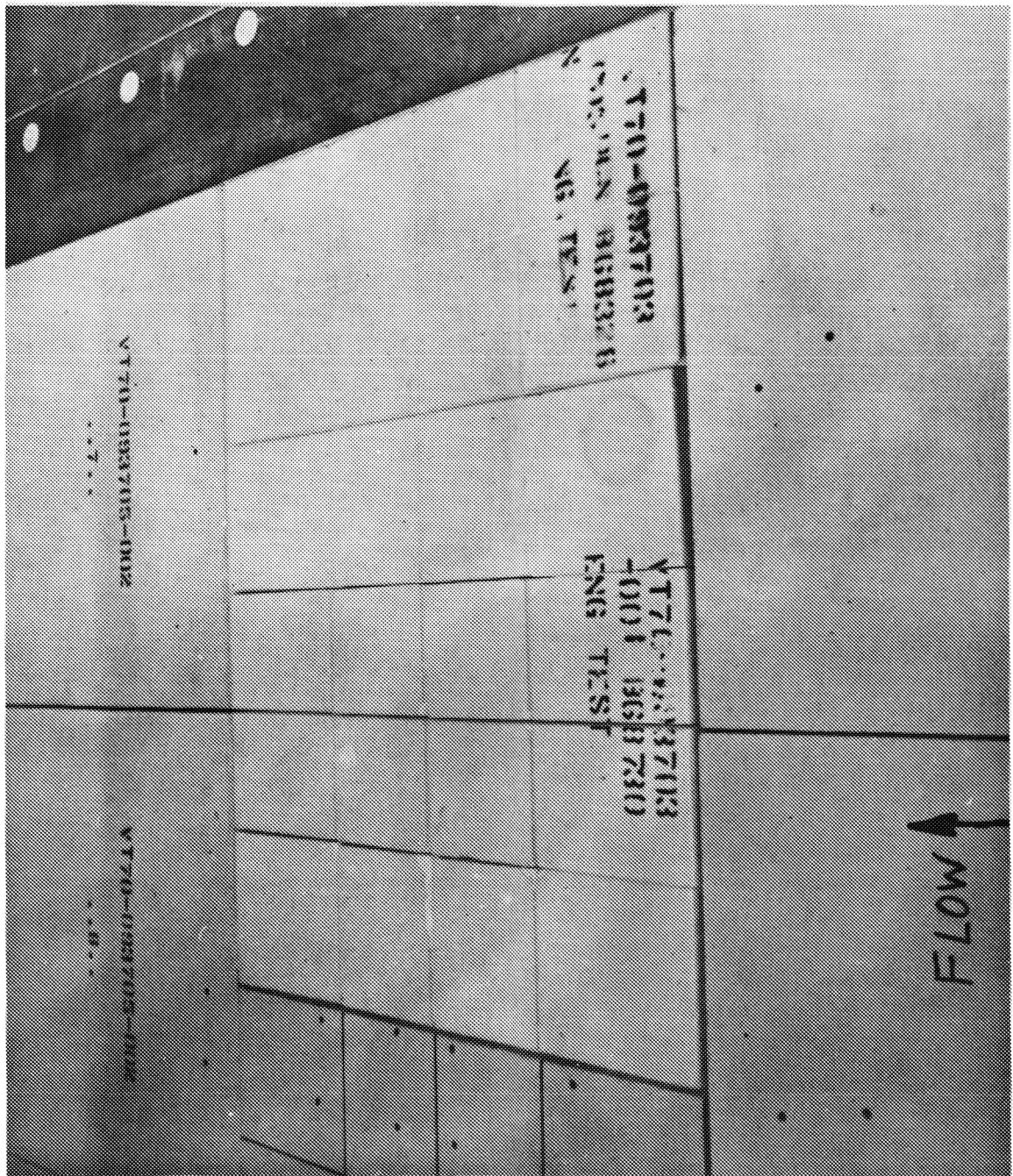
j. Pretest Photograph of the Mini-Tile LRSI Test Specimen for Test OS45

Figure 2 (Continued)



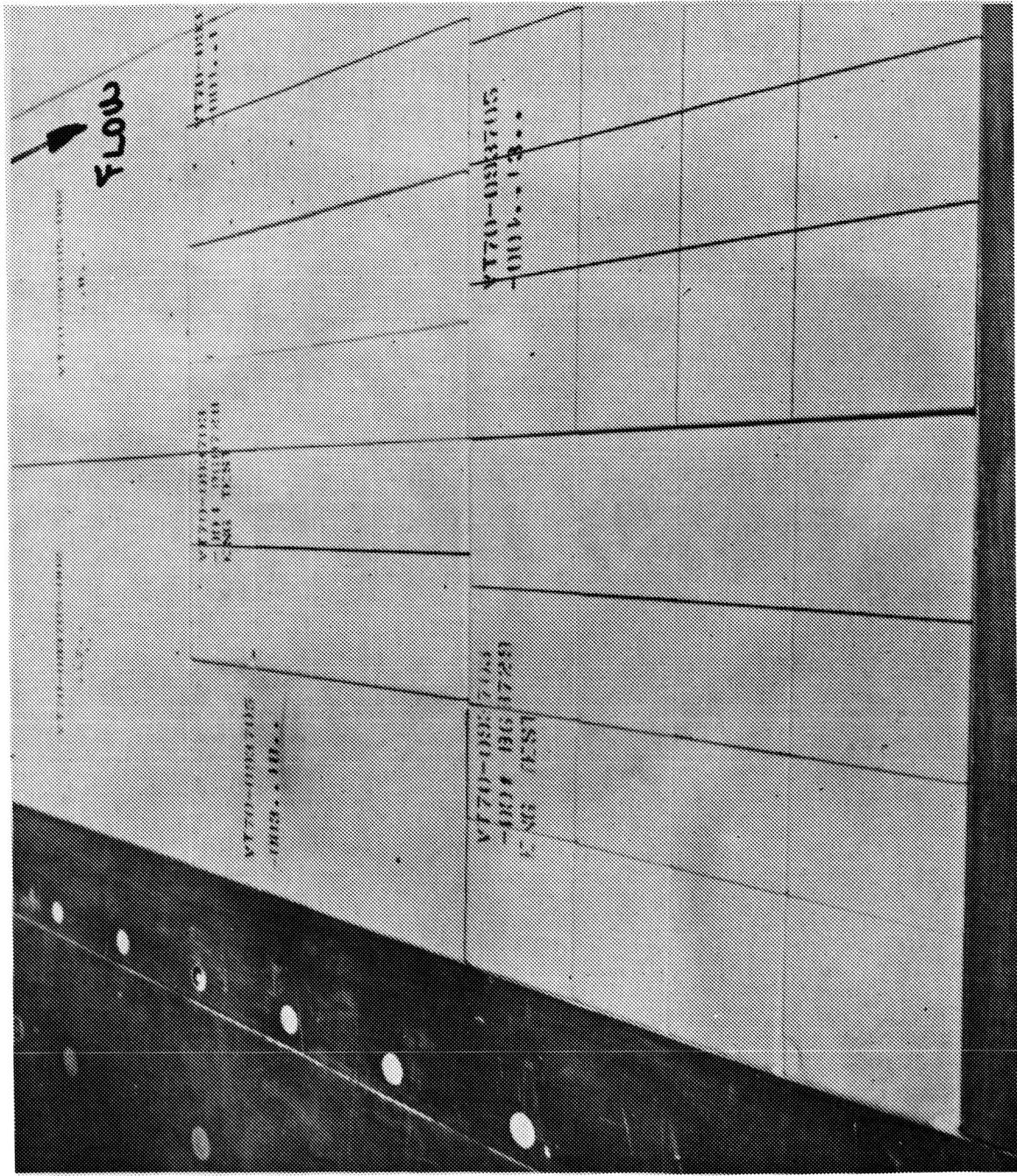
k. Post-Test Photograph of the Mini-Tile LRSI Test Specimen for Test OS45

Figure 2 (Continued)



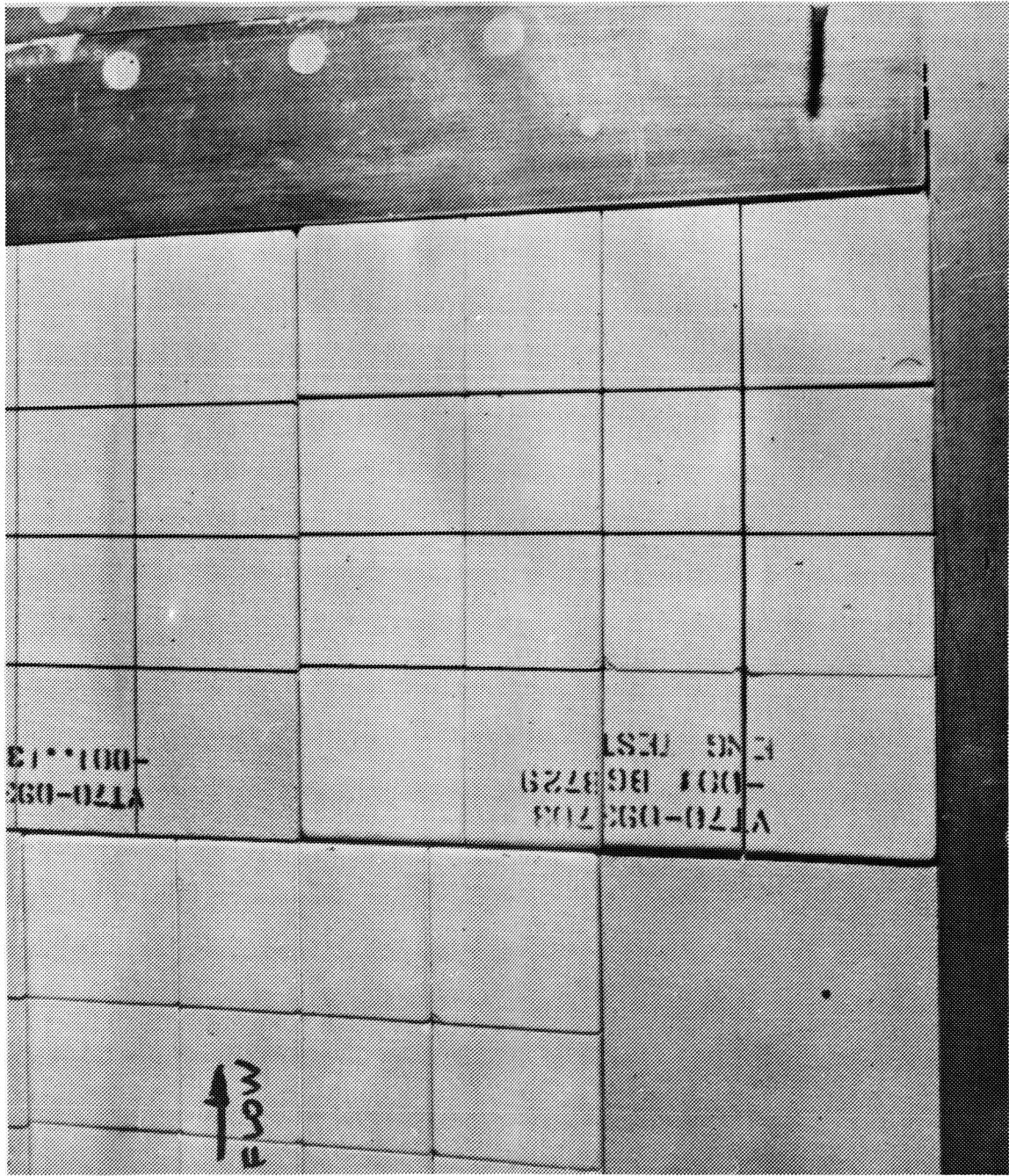
1. Post-Test Photograph of the Mini-Tile LRSI Test Specimen for Test 0845

Figure 2 (Continued)



- m. Post-Test Photograph of the Mini-Tile LRSI Test Specimen for Test OS45

Figure 2 (Continued)



n. Post-Test Photograph of the Mini-Tile LRSTI Test Specimen for Test OS45

Figure 2 (Concluded)

## APPENDIX

## TABULATED SOURCE DATA

<u>Dataset</u>	<u>Description</u>	<u>Page</u>	<u>Microfiche Page</u>
<u>OS41</u>			
R3LA33-47	Fixture Pressure Coefficient	1- 15	1- 1
R3LC33-47	Panel Strain Gage Data	16- 30	1- 1
<u>OS42</u>			
R3Ø001-090	Fixture Static Pressure	31- 120	1- 3
A3Ø001-090	Fixture Pressure Coefficient	121- 210	3- 4
B3Ø001-090	Fixture Pressure Ratio	211- 300	4- 5
<u>OS45</u>			
R3SAAA-AGE	Diced Tile Gap Static Pressure	301- 461	6- 9
R3SBAA-BGE	Tile Gap Static Pressure	462- 622	9-12
R3SCAA-CGE	Fixture Static Pressure	623- 783	12-14
R3SDAA-DGE	Diced Tile Static Pressure (Bottom)	784- 944	14-17
R3SEAA-EGE	SIP Static Pressure	945-1105	17-19
R3SFAA-FGE	Diced Tile Surface Pressure	1106-1266	19-22
R3SGAA-GGE	SIP-Filler Bar Cavity Static Pressure	1267-1427	22-24
R3SHGF-HGX	Quartz Pillow Static Pressure	1428-1446	24-25
P3SAAA-AGE	Diced Tile Gap Pressure Coefficient	1447-1607	25-27
P3SBAA-BGE	Tile Gap Pressure Coefficient	1608-1768	27-30
P3SCAA-CCE	Fixture Pressure Coefficient	1769-1929	30-32
P3SDAA-DGE	Diced Tile Pressure Coefficient (Bottom)	1930-2090	32-35
P3SEAA-EGE	SIP Pressure Coefficient	2091-2251	35-37
P3SFAA-FGE	Diced Tile Surface Pressure Coefficient	2252-2412	37-40
P3SGAA-GGE	SIP-Filler Bar Cavity Pressure Coefficient	2413-2573	40-43
P3SHGF-HGX	Quartz Pillow Pressure Coefficient	2574-2592	43-43